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Light Passenger Cars on the "Consolidated."

The New York, New Haven & Hartford
Railroad Company,
New Haven, Conn., Oct. 31, 1898.

To the Editor of the Railroad Gazette:

Replying to your favor of the 24th instant, in regard to light railroad coaches. We have built but one car of this character, which went into service on Oct. 14, 1898. Effort was made to construct the body as light as possible, no change having been made in the trucks. The reduction in weight was effected by the distribution of the timber, reduction of sizes in the upper framework and by the use of Oregon fir timber throughout the frame, with the exception of the end sills and other parts where oak is required. The interior finish was lightened, and the sheathing on the exterior of the car was made quite thin. It was found that a reduction of 80 lbs. per lineal foot of body of the car was effected, as compared with the standard coach of the same length and character. I may add that aluminum seat frames were used.

So far the car has given us excellent service, the framing of the same having been designed by Mr. E. E. Pratt, who was at one time Master Car Builder of the New England road, and is now Superintendent of the Building Department of the New York, New Haven & Hartford Railroad. The car was constructed in our New Haven shops.

WM. P. APPLEYARD,
Master Car Builder.

Concerning the Decision in the Joint Traffic Case.

To the Editor of the Railroad Gazette:

Throughout the opinion the Court recognized but one kind of competition—that of rates. That there are others is obvious, and they are, within certain limits, as potent as that in rates. There exists, for instance, a competition by railroads between large cities in quality of service. An agreement which should limit the speed or frequency of trains upon lines thus competing might and probably would operate to diminish travel, and so restrain trade; but an agreement designed to restrain the competition in rates, if at the same time calculated to reduce the volume of transportation, would not find favor or be likely of adoption by traffic managers, the demand being that the volume shall grow with a healthy and continuous growth. If competition of any kind becomes excessive; that is to say, such as to be conducted at non-remunerative rates, the reaction which may and almost assuredly will involve the contraction of the volume of the business competed for, is sure to come, and thereupon combination is likely to ensue. Under a combination, rates as well as other elements of competition are carefully regulated, but when such regulation is found to operate to diminish the volume of transportation below that which at low rates with good service shall produce the largest profit, the management is inefficient and unsuccessful and will not endure.

Even if the transportation lines of the country should one day be absorbed into a vast corporation, exercising powers uncontrolled by statute, it would become essential to the greatest success of that corporation to provide those facilities and do its work at those rates which would return in the aggregate the greatest constant profit. This is the limit of economical operation in all cases, and it would seem that any

statute which did not recognize the principle involved would be liable to arraignment as unconstitutional.

But such a result could not be attained by statute, nor could it by mere human foresight. The true mean is to be arrived at only by the tentative and infinitely delicate process of adjustment to the laws of supply and demand.

E. M.

The Passenger and the Car Gate.

St. Louis, Oct. 21, 1898.

To the Editor of the Railroad Gazette:

Permission is asked by a long-time reader, who, unlike most of yours, travels much and pays his fare, to file a protest against your attitude toward such portion of the traveling community as resent the increasing tendency to subject them to annoying and needless restrictions.

Your assumption that those who object to being held up and examined one time more by a gateman are dishonest is as unfair as it is unlike your usual tone toward the non-railroad public. Its best answer is that in the matter on which you lay especial stress, collusion between dishonest conductors and traveling men, the ticket gate system is no preventive at all, since a short ticket and cash may carry long mileage.

If you had enjoyed the opportunity, some cold, rainy morning, of standing at a country station, with hands full of umbrella and grip, while a crowd of disgusted passengers filed slowly before the exacting punch of the gateman, it is dollars to dimes that you would not charge the public with dishonesty for resenting the annoyance in every possible way.

That they do so resent it, the recent experience of the Chicago & Alton proves. That they have shown it in the only possible way a railroad can be made to feel it, by transferring their patronage where the red tape is not so strong, is fortunate for those travelers who would preserve some freedom of movement and quickness of action.

The experience of the writer may show how one small unit of the public resented the annoyance. Living in Chicago & Alton territory, traveling from thirty to forty thousand miles per annum, after the establishment of the gate throttle several years since, the writer has taken just three journeys on the Chicago & Alton road, one, a local trip when the nuisance was first met in its aggravated form, the other two for the sake of company previously routed. Travelers resent the gate nuisance for the same reasons that they object to the increasing and unfair restrictions on all kinds of tickets, such as the refusal to accept mileage books on trains, the limitation on local and other tickets for which full fare has been paid, and the petty friction of needless exchanges, interruptions and punchings. It is rapidly reaching the point that to use railroad tickets one must go through as much red tape as to pass a Russian Police Inspector.

Against collusion between dishonest conductor and passenger these restrictions avail naught in the end; meanwhile they serve to detain, annoy and chafe thousands of passengers whose good will should be worth something.

That an agreement between all roads to introduce the gate system would leave the public powerless to resent the action, as suggested in your editorial of Oct. 14, is doubtless true, but it would simply be another of the arbitrary acts which pile up the body of public resentment shown from time to time in wild jury verdicts, erratic decisions or drastic hostile legislation.

The Annual Inspection of the Boston & Albany.

To the Editor of the Railroad Gazette:

The annual inspection of the Boston & Albany, which has just been completed, disclosed no new features of particular importance, but confirmed in a striking manner the conclusions and expectations of the inspections of previous years as to the effect on the track and roadbed of the change from the rails of medium weight, with which the track was formerly laid, to those of the larger and stiffer section adopted a few years ago. The track has steadily improved from year to year, and never has the general average been so good nor so well maintained. Also the cost has materially decreased, as it is found that the heavy rails now in use do not wear the ties or displace the ballast like the more flexible rails formerly in the track. It will perhaps be thought a mere assumption that the weight of the rail, and much more its stiffness, could have anything to do with the wear of the roadbed under the ties, but certain peculiarities noticed by Mr. Dudley some years since led him to believe there might be an unsuspected influence which would explain better the discrepant results obtained than the mere difference in the width and spacing of the ties, or the assumed difference in the efficiency of the trackmen or the material of which the ballast was composed, which had previously been the only explanation supposed possible. The invention and perfection of his stremmatograph (which has lately been described in the Railroad Gazette) has shown almost beyond question that where the section of the rail is deficient in stiffness, not only is there increased flexure in the spaces between the ties and so an increased resistance to the

movement of a load, but the rails rock upon the ties—which he had discovered before—and the ties themselves rock upon the ballast below them, displacing it to a degree dependent upon the extent of the movement, and that, no matter how often or how faithfully the ties may be tamped, they will not remain firm, nor the track remain in line and surface; and this independently of the wear of the rails on the ties or of the firmness of the spiking.

The extent of the change which has taken place on the Boston & Albany is best shown from the Dynagraph diagrams (taken this year as in previous years), and which were fully described in the Railroad Gazette of Dec. 17, 1897, which give the means of estimating the actual amount of differences of various kinds from year to year, while in other ways it is only possible to discover that they exist.

In the years while the medium weight rails were in use the sum of the total vertical inequalities of the surface of the rails, which represents in a general way the efficiency of the work of the trackmen, was from six to eight ft. in a mile. Only under the most favorable conditions and in exceptional circumstances could the lower figure be attained; the average has steadily fallen, until in the recent inspection mile after mile taken consecutively showed only between two and three feet as the sum of all the vertical undulations, notwithstanding that the summer has been a remarkably wet one, and that a month before the inspection a terrific thunder storm did much damage to the roadbed, the new material in which had not become thoroughly consolidated at the time of the inspection.

Also the weight of locomotives and trains has greatly increased in recent years, so that, were the conclusions cited above incorrect, just the contrary effect should be obtained from that which is observed.

As was pointed out in the article of Dec. 17, a first class track is not a thing of a few days' or weeks' work; it takes years of time. A washout or other disturbance of the roadbed is not repaired when the new material has been put in place of the old.

This year the experiment has been tried of sprinkling the roadbed with oil to prevent dust. One hundred and ten miles of the double track main line has been treated, besides 16 miles of four track section and 10 miles on the Newton Circuit, making in all about 304 miles of track which has been sprinkled.

It is too early yet to observe what the full effect of this will be, but thus far the difference is very remarkable. Those persons who believe that it is necessary to lay a track in rock ballast to prevent dust should take a journey over the Boston & Albany, where they may discover how to do it effectively at a small fraction of the expense of broken stone, and also save the advantages of gravel ballast.

It may be found also that an improvement in the drainage and in the durability of the ties will result, as it has been observed that the water runs off much more freely than formerly; but it will require longer study and comparison to establish anything definite in these respects.

The prizes awarded as a result of this year's inspection have just been announced. There are four division roadmasters and four prizes, so that no one of these officers has to put up with a blank. The first prize went to E. A. Haskell, Springfield; second, T. J. Sullivan, Springfield; third, R. A. McQuaid, Chatham; fourth, C. B. Lentell, Boston. The condition of each section is marked by the Chief Engineer and by the three roadmasters not connected with that section, and the rating is based on the average of these four marks. The condition of the section is considered under ten heads, to wit: Line, surface, joints, spikes, switches, frogs, ballast, sleepers, ditches, cleanliness. The first section master's prizes (one on each division) went to John Whelan, Div. 1; William Reardon, Div. 2; James Sullivan, Div. 3; Eli Kipp, Div. 4.

Locomotive Boiler Testing.

Mr. Howard H. Maxfield, in the Stevens Indicator for October, suggests a modification of the usual proceedings for accounting for the coal burned in locomotive boiler tests where the engines are tested in fast express service on runs of about 100 miles, so as to reduce the errors caused by starting and stopping the test. The plan proposed is the result of an investigation on the Pennsylvania Railroad with the express trains between Jersey City and Philadelphia.

The present practice for beginning a road test is to have the fire in good condition before starting and to estimate the amount of coal on the grates at the beginning, while at the end of the test the fire is put in as nearly the same condition as possible. Mr. Maxfield, however, has found that under the conditions which he describes, the error in the coal measurement in this way may be as great as 10 per cent., but by a modification of the method it need not exceed 1 per cent. He discussed the subject as follows:

Let it be assumed that the test is to be made using only what data may be obtained from the time the train leaves the station at one end of the division until it reaches the other, the coal used to be anthra-

cite. There is in the firebox about 1,600 lbs. of green coal, and by "green" is meant coal that is capable of imparting all, or nearly all, of its heat units to the water, including, of course, those heat units that are lost through the stack and by radiation. The observer does not know, however, the exact quantity of coal in the firebox at the start, and as this must be allowed for, it will be necessary to endeavor at the end of the run to bring the fire to the same condition as at the start. Assume, again, that 4,000 lbs. of coal was fired on the run, the figures being about the average of the tests, this including the weight which the observer decided was necessary to add to bring the fire at the end of the run to the same thickness as at the beginning. The meter readings show that 28,000 lbs. of water have apparently been evaporated, making an evaporation of seven pounds of water per pound of coal.

Now, allow that the fire at the end of the run is of exactly the same thickness as at the start, which it probably is not. The error creeps in at this point, due to the fact that the fire at the start was not only of a certain thickness, but it was also practically unconsumed. At the end of the run, however, the bottom of the fire is composed of several inches of ashes. Just how deep this layer of ashes will be for any given case it is not possible to say, but it is safe to assume that there will be at least 3 in. of ashes under ordinary conditions. Then the actual thickness of fire is 3 in. less than it should be, or our coal pile is 400 lbs. short; in other words, under ordinary conditions the observed weight of coal is too small by 10 per cent. of itself, an error of over 9 per cent. of the total weight of coal used during the run. As the total weight of coal used increases the per cent. of error decreases, and under the most favorable conditions, that is, for extremely long runs, the error may be reduced to almost nothing. However this may be, it is certain that for service such as we are discussing there is a probable error, which may be as great as 10 per cent. of the total coal used.

It being necessary that there should be a fire of some sort at the commencement of the test, and consequently an equalization of the fire at the completion, the method of minimum liability to error is that which will deal with the smallest possible fire. This condition is realized in the banked fire. A banked fire will ordinarily contain about 500 lbs. of coal. Moreover, it is confined to a small space near the fire door, is easily gaged and may be duplicated almost exactly. If now the boiler test is begun in the roundhouse with a banked fire, and ended at the roundhouse with a banked fire, the apparent evaporation of water per pound of coal may be determined with great exactness.

At the last possible moment before leaving the roundhouse in the morning, the size of the bank, which is green coal (if ashes are present they can easily be separated and dropped into the ash pan) is gaged as accurately as possible, observations being taken of the height of water in the gage glass, steam pressure and meter readings. Then the fire is shoved down, covered, and the boiler test is begun. The blower may be used to bring the steam pressure to the point at which it is maintained during the run, as a separate account is kept of the steam used by the engine while hauling the train, but it is better to use an auxiliary blower for the purpose. All coal used is put up in bags of 100 lbs. each. A careful account is kept of all coal that is put into the fire-box from this time until the fire is banked at the other end of the division. As a matter of information, the coal account is divided into three different parts, namely: Weight of coal used to cover the fire, and added before leaving the station on the run; actual weight of coal shovelled into the firebox while hauling the train; weight of coal used after the run and for banking. As soon as the engine reaches the roundhouse at the other end of the division the fire is cleaned and banked. This bank is made as nearly as possible the same as when the test was started. The ashes and sparks are then weighed. The meter readings, height of water in the gage glass and steam pressure are taken just before leaving the station at the start and just after arriving at the station at the end of the run, also at the time the fire is banked at the roundhouse. From the total weight of water apparently evaporated between "banks," and the total weight of coal fired, including that weight used to bank the fire at the finish, the apparent evaporation per pound of coal is determined. Now, from the actual weight of water apparently evaporated between stations as shown by the meter, and the observed evaporation per pound of coal as determined above, the actual weight of coal which is consumed in hauling the train over the division is determined, and from this figure the coal per car mile, coal per ton mile, train miles per ton of coal and coal per square foot of grate and heating surfaces per hour are determined, these figures being the most important.

Let us follow such a test, using the average figures. Assume a bank of 500 lbs. of coal. This is consumed during the test, and must be allowed for, as it is not at present a known factor. The meter readings, etc., are taken, the fire is shoved down, and 1,300 lbs. of coal are added to the fire. The engine is then backed to its train, and at the last possible moment readings are taken of the meters, gage glass and steam gage.

During the run observations are taken at regular intervals. During the run between the terminal stations 3,000 lbs. of coal are fired. Upon entering the station at the end of the run the fire is in a very poor condition, and 300 lbs. are added to maintain it. The meter and other readings are then taken. On the trip 27,500 lbs. of water have been apparently evaporated. At the roundhouse the fire is thoroughly cleaned and banked, care being taken that the size of the bank is the same as at the commencement. To do this, 400 lbs. of coal are used. The meters show that 30,000 lbs. of water have been used from the time that the fire was shoved down until it was banked. The weight of coal used to evaporate this weight of water is $1,300 + 3,000 + 300 + 400 = 5,000$ lbs. This is equivalent to $500 + 1,300 + 3,000 + 300 = 100$, this latter number, 100, being the weight of coal that is left in the firebox as the engine reaches the roundhouse, under the assumption that the weight of the original bank and the weight of coal left in the firebox at the end of the test are known. Hence, the evaporation of water per pound of coal is $30,000 \div 5,000 = 6$. This figure divided into 27,500 = 4,600 lbs. of coal, in round numbers, as the weight required to evaporate the actual weight of water used on the run between the stations.

It is hardly possible that an error of 100 lbs. could be made in equalizing the two banks, but, allowing that the bank is 100 lbs. short of what it should be, the error involved is 100 lbs. in 5,100; or less than 2 per cent. If, however, care is exercised, the error can easily be kept within 1 per cent., and by making sure that the final bank is at all events no smaller than the original, the error can always be kept on the safe side, so that we can be positive that we are not claiming too much for our locomotives. There is only one other possibility of error, and that is due to the fact that the test is in progress while the engine is in two entirely different conditions of service, viz., running light to and from the roundhouse, and running with the load applied. As the data desired deal entirely with the engine while hauling its train, it may be questioned as whether the first of the above conditions is not detrimental to the results. But, even so, it will be observed that during the run to and from the roundhouse the evaporation per pound of coal will be less than while the engine is hauling the train. And if the train dispatcher will lend his assistance, the time consumed in running to and from the roundhouse can be made so short that it will practically have no effect on the results, and, if care is taken to maintain the steam pressure the same as during the run, it would seem that this factor is almost nothing. At all events, the only two possible errors are both such as would tend to show the engine in an unfavorable light, rather than in a favorable one, a condition very much to be desired in all cases where it is not possible to obtain absolutely exact data.

In order to test this method of taking observations, a series of tests was made for six consecutive days, using the same engines, the same crews, and hauling the same trains, with the identical cars used on the previous tests. The weather conditions were practically constant for both series of tests. The fires were shoved down some time before it was necessary to start the test, and sufficient pressure of steam was obtained by forced draught. Then the fire was drawn, and a new fire kindled with weighed wood and coal. At this point the readings were taken as before. In order to approach as near as possible to service conditions a high steam pressure was maintained continuously until the engine was coupled to its train. At the end of the run the steam pressure was also maintained until reaching the roundhouse, where the fire was cleaned and drawn, care being taken to have the same steam pressure as when the fire was lighted. The draw fire was cooled and weighed, also the ashes and sparks. By this method the exact weight of coal was obtained, and from this the results were calculated. These results were almost identical with those obtained by the method above explained, the evaporation per pound of coal averaging a little higher than by the former method. Of course it is not possible to conduct a series of tests by this last method, it causing a great deal of inconvenience, and materially interfering with the regular routine of the roundhouse, and it would probably interfere with the regular running of the train. The first mentioned plan causes little, if any, more trouble than the ordinary preparation of the engines for their runs.

Specifications for Railroad Bridges.

In the October Proceedings of the American Society of Civil Engineers is published the advance copy of a paper on "The Launhardt Formula and Railroad Bridge Specifications," by Henry B. Seaman, M. Am. Soc. C. E., to be presented at the meeting of November 16th, 1898. We shall not reprint any part of this paper, or of the specifications proposed by Mr. Seaman; it is better that one should read it all than by fragments, and the full text can easily be had from the Secretary of the Society, or from Mr. Seaman. We shall give, however, a synopsis of the paper here, and it is treated editorially on another page.

The paper presents in brief form, and without mathematical details, a review of the data upon which the theory of fatigue of metals is based, and of the application of the Launhardt formula to those experiments. It accepts the theory of "fatigue of metals" as having been demonstrated by experiment, and, while commending in a general way the results obtained by the Launhardt formula, points out the extra labor of calculation which its application involves, and outlines what is thought to be an equally rational, though less laborious, method of dimensioning. It makes an analysis of Wöhler's experiments, and demonstrates that, although we have no such definite knowledge of "fatigue of metals" as would justify so precise a formula as that proposed by Launhardt, the effect of live strain is about twice as injurious, under continuously repeated loads, as that of dead strain.

With this as a premise, the proposed method of dimensioning is explained. A permissible dead strain is selected and all other conditions reduced to this basis. Dead and live strains are calculated separately, as usual, and additions made to the live load for effect of impact. The strains which are resisted by columns are provided for by the column formula, as usual, the whole reduced to equivalent dead strain, and the required sections calculated in the usual way.

The paper is supplemented in the form of an appendix by a specification for railroad bridges—outlined from what is assumed to be the best general practice of the present time. The purpose of the specification is to present a basis for a general discussion of the subject, in the hope of securing a more uniform general practice.

Causes of Trains Breaking in Two.

In our issue of October 14, page 744, we published tables showing the causes of the 34 failures of couplings or drawbars which were recorded on two divisions of the Nashville, Chattanooga & St. Louis in the month of August. Since then Assistant General Manager Thomas has sent us similar records for the six months preceding August, and we have classified the causes for the whole period, throughout the company's lines. These records show that in all 217 trains were reported as breaking in two, during the seven months, and the causes noted were as follows:

1—M. C. B. coupler unlocked.....	35
2—" " " knuckle broken.....	14
3—" " " coupler broken.....	7
4—Coupling pin lost or jumped out.....	30
5—Coupling pin broken.....	25
6—Link broken.....	18
7—Tail bolt broken.....	28
8—Tail bolt key lost.....	27
9—Tail bolt key broken or sheared off.....	9
10—Tail bolt lost.....	2
11—Draft timbers broken.....	8
12—Draft timber bolts broken.....	2
13—Drawbar (old style) broken.....	4
14—Loose carrier iron.....	1
15—Failure of drawbar between engine and tender.....	1
16—Unclassified.....	2
17—Unexplained.....	1
18—Miller drawbar broke.....	1
19—Miller knuckle worn.....	1
20—Weak side spring (Miller).....	1

In most of the cases of failure of metal the report contains a brief note of its condition or quality. In one case a tail bolt which broke is said to have been made of "miserable iron." One or two of the tail bolts included under the head of "broken" were worn so that they pulled through. The most common note in cases of metal failure is (a) defective casting, or (b) evidence of rough handling. Of the pins missing, nearly all are reported as having jumped out. "When train was bunched" is the most common explanation of pins jumping out. Item No. 3 includes breakages of knuckles and knuckle pins. Too sudden application of brakes, especially when backing trains, accounts for a good many failures. One M. C. B. coupler came open because the uncoupling chain had been shortened so that it held the pin too high.

It will be noted that all of the couplers included in the first three items were of the M. C. B. type. All under the fourth, fifth, sixth and 13th were of the link and pin type. The other items, except the last three, include both kinds of freight car couplers.

Report on the Whittenton Collision.

The State Railroad Commissioners of Massachusetts have issued their report on the collision of passenger trains at Whittenton Junction, Mass., on the New York, New Haven & Hartford, Sept. 6, in which one passenger was killed and 12 or more injured. The statement of facts published in the Railroad Gazette of Sept. 30, page 711, is substantially correct. Trains 319 and 1301 approached the junction on converging tracks, reaching the crossing almost at the same time and the latter train ran against the former, overturning one or two cars. The signals were right for train 1301; the home and distant signal lights for train 319 were not burning and the engineman ran past them on the strength of what he supposed was a hand motion signal from the signalman in the tower. It appears that the engineman of train 319 (from Mansfield), C. H. Bourne, at first took the crossing-gate light for the home signal light; this led him to run down to the home signal too fast to stop at the signal post. Some time before he reached the home signal the framework of the tower concealed the crossing

light from him, and then, when it came again into view, he took it for an up-and-down hand motion signal. He finally stopped with his engine about 120 ft. beyond the home signal. It was the burner of the home signal lamp, not the case, which was bent, and caused the failure of the flame.

The Board places no blame on any person on train 1301, but says that the accident was primarily due to the fact that Engineer Bourne at first mistook the lantern on the highway gate, showing through the tower window, for the home signal, ran down to this signal too fast, and afterward, when the gate was being lowered, mistook the same lantern, which was swinging as the gate went down, for a hand signal to proceed. If the light had not been so placed as to render possible this unfortunate misunderstanding, the accident would not have occurred.

The tower man was to blame, because he did not obey his instructions to let the Mansfield train in ahead of the Whittenton train, but his responsibility for the accident was slight, the Board thinks, for while this accident would not have occurred if he had followed instructions, nothing he could have done could have caused an accident if the engineers of approaching trains had obeyed the signals before them. It was the duty of the tower operator to observe whether the lights on the signals were lighted, and light them if any had gone out, but the understanding is that he saw they were out, but was prevented by other duties from lighting them, and had no person to send. This operator did not appear before the Commissioners.

Though the fault must rest largely with the engineer of train 319, the Board does not think him deserving of great censure, though he showed a lack of judgment and discretion. He was led astray by the supposed hand signal caused by the lowering of the white light on the highway gate. The Board thinks he ought to have known that he was four minutes late, and on the time of the Whittenton train, and that he would have shown better discretion to have further obeyed the supposed hand signal, and kept on to Taunton, when no accident would have occurred. Through excessive caution, he stopped at the tower to inquire if the coast was clear, leaving his train directly exposed to collision. If he wished to make sure he should have stopped his train before reaching the home signal, and have sent his fireman or a brakeman to the tower to make inquiries.

In summing up, the Board says that the accident is curious and instructive in several ways. It shows that a lantern on a highway gate may sometimes be mistaken not only for a fixed safety signal, but, when being lowered, for a hand signal to go ahead. It would therefore seem desirable that such lanterns, if it is necessary to place them where this mistake may occur, should be screened in some way, so that they cannot be seen from along the track. The accident, moreover, illustrates the danger which may result from the use of the white light as a signal for safety on a railroad, owing to their general use for other purposes. Again, it is evident that an engineer should not stop his train where it is exposed to collisions while he makes inquiries in case of doubt. The accident also shows that a very slight defect may render a signal lantern likely to be extinguished after burning a few minutes, and it is a matter of importance to use lamps that cannot easily be injured, and to make sure that a lamp which makes trouble by going out is not defective. Finally, the accident is another proof of the desirability of derailing switches at junctions and crossings. It is admitted that on the advisability of using them there is a difference of opinion, even among signal experts; but this accident in all probability would not have occurred if they had been in use at this junction.

New Locomotives for the South Eastern Railway, England.

By J. Pearson Pattinson.

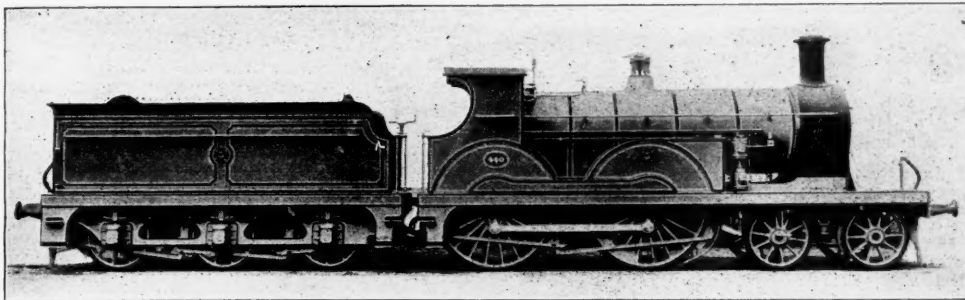
The express train service of the South Eastern Railway has for many years been worked by an efficient type of four-coupled bogie locomotives, the first of which appeared as far back as 1834. Since that time, although speed has not greatly increased on this railroad, train loads have appreciably become heavier, and the task of the locomotive is undoubtedly a harder one than it was 15 years ago. To meet the demands for greater power, Mr. James Stirling, the company's Mechanical Engineer, has designed a powerful machine with increased heating surface, and with greater weight on the coupled wheels. These new locomotives are known as the "440 class," and their principal dimensions are given, side by side with those of the earlier bogie expresses, in the subjoined table:

	Old 7-ft. Coupled.	New 7-ft. "440 Class."
Cylinders	19 by 26	19 by 26
Heating surface, total.....	94.26	1,100
Wheels, bogie, diameter.....	3 ft. 9 in.	3 ft. 9 in.
" coupled	4 ft.	4 ft. 0 in.
" tender	30,460	33,600
Weight on bogie wheels.....	35,616	36,736
" " main drivers.....	29,120	31,816
" " rear	64,736	69,552
Capacity of tank.....	2,660	3,000
Fuel capacity	8,960	6,720
Weight of tender.....	68,320	75,360

These five engines differ in external appearance

from the earlier type in having bright brass casings to the safety valves and the coat of arms of the company is in the center of the tender panels. Generally, also they are of more massive appearance, the boiler being larger and standing higher than in the older engines.

By the kindness of the Traffic Manager an opportunity of testing the work of these locomotives in daily practice was afforded quite recently. The tests were made purposely on a Sunday, so that signal delays might be less likely to interfere with free running, and the results as given in the tables below



One of the "400 Class" Locomotives for the South Eastern Railway, England.

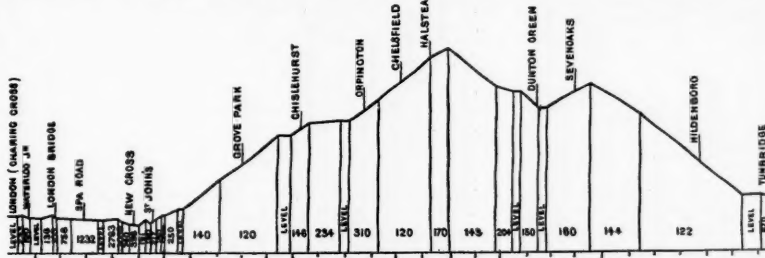
represent good work. A gradient profile, showing the heaviest part of the line (between London and Tunbridge Junction), will render assistance in forming an opinion of the work done. The down train was heavier than the up, and perhaps the finest part of the down run was on the almost level stretch from Tunbridge Junction to Ashford, which was covered in the creditable time of 29½ minutes (26½ miles), with 232 tons on. On the return journey the locomotive appeared to most advantage, mounting the heavy grades between Tunbridge and Sevenoaks, the speed up the 1 in 122 never getting below 36 miles an hour. Further particulars are given in the complete logs subjoined:

Canon Street to Folkestone Junction.
(69½ miles in 89½ minutes.)
New South Eastern locomotive, No. 442, and load of 232 tons.
July 25th, 1898.

Distance, Miles, Chains.	Stations.	Actual time, H. M. S.
0	Canon Street.....	10 13 12
55	London Bridge.....	10 15 42
59	New Cross.....	10 20 37
32	St. Johns.....	10 21 36
7	Hither Green.....	10 23 56
10	Grove Park.....	10 27 9
10	Chislehurst.....	10 32 2
52	Orpington.....	10 36 38
6	Chislehurst.....	10 39 1
27	Halstead.....	10 41 34
29	Dunton Green.....	10 46 30
70	Sevenoaks.....	10 48 8
62	Hildenborough.....	10 53 37
28	Tunbridge Junction.....	10 56 11
52	Paddock Wood.....	11 2 7
15	Marden.....	11 6 50
50	Staplehurst.....	11 9 31
44	Headcorn.....	11 12 57
25	Pluckley.....	11 18 59
71	Ashford.....	11 25 30
16	Smeeth.....	11 30 39
77	Westenhanger.....	11 35 30
18	Sandling Junction.....	11 38 53
68	Shorncliffe.....	11 41 12
68	Folkestone Central.....	11 41 56
59	Folkestone Junction.....	11 43 4

*Nearly stopped between Cannon Street and London Bridge because of repairs to permanent way.

†Slowly round Tunbridge curve.
Note.—The Boat express is timed to run from Charing Cross to Folkestone Harbor in 100 minutes (10 a. m.—11.40 a. m.), but ran on this occasion via Cannon Street, owing to road being under repair. Between Folkestone Junction and the harbor station the train is reversed, and, hauled by a powerful



Profile from Charing Cross to Tunbridge Junction.

NOTE.—The figures indicate grades, thus: 122 means that the grade is 1 in 122.

tank locomotive, cautiously descends the severe grade of 1 in 30 between the two stations.

Folkestone Junction to Charing Cross.
(71 miles in 95½ minutes.)
New South Eastern locomotive, No. 448, and load of 168½ tons.
July 25th, 1898.

Distance (from Folkestone Junction), Miles, Chains.	Stations.	Actual time, H. M. S.
0	Folkestone Junction (East of).....	4 28 58
71	Folkestone Junction.....	4 30 23
1	Shorncliffe.....	4 34 15
41	Sandling Junction.....	4 40 40
62	Westenhanger.....	4 42 30
68	Ashford.....	4 52 3
25	Pluckley.....	4 59 13
56	Headcorn.....	5 5 18
29	Staplehurst.....	5 9 6
31	Marden.....	5 12 13
36	Paddock Wood.....	5 17 23
41	Tunbridge Junction.....	5 23 36
43	Hildenborough.....	5 27 15
48	Sevenoaks.....	5 35 9
50	Dunton Green.....	5 36 57
54	Halstead.....	5 42 40
55	Chislehurst.....	5 44 13
57	Orpington.....	5 45 40
59	Grove Park.....	5 48 21
77	Hither Green.....	5 52 26
70	St. Johns.....	5 54 4
27	New Cross.....	5 54 55
68	London Bridge.....	5 58 53
0	Charing Cross.....	6 2 10
70	Charing Cross.....	6 4 6

Track Bonding.*

The tracks of the Brooklyn Heights Railroad were originally bonded with the familiar supplementary wires, the section of the rail being such that it was difficult to use any other method. This wire, as well as the branches leading to the rails, was tinned so as to make good contact with the earth, and large copper plates, also tinned, were placed in the damp soil or water in the vicinity of the power house. These plates soon became corroded and coated with insulating substances, and were practically of no

value in returning the current, so return feeder wires were run out to make frequent taps to the supplementary wire. As the traffic of the road increased, the cost of this return copper became a serious matter, and when it became necessary to relay the tracks, in 1895, the question of bonding received careful consideration. The rails were practically carrying no current, and it was decided that the new construction of 9-inch girder rails would increase considerably the conductivity of the return circuit, provided they were properly bonded. To take full advantage of the large amount of metal for the track, a bond of high conductivity, the shortest possible length and low contact resistance was required. At that time no bond meeting all these conditions could be found, and one was designed by the engineers of the company.

[A bond, designed by the engineers of the company, is then described. This is about 5 inches wide, ¼ of an inch in thickness and made of copper. To secure good connection a reinforcing plate of cast iron was placed beneath the area of contact and the bond pressed firmly against the rail by means of bolts. To prevent corrosion, a non-hardening pitch was forced into a groove around the bond. Recent tests show that these bonds have practically the same resistance as when first put in place three years ago.]

This bond was somewhat cheaper than the plate bond, and good work was more easily obtained on account of the better chance of inspection. The use of such a bond had been discussed the two previous years, but was not developed on account of a doubt as to whether the contact could be made large enough to prevent heating when considerable current was flowing, that might give rise to thermoelectric effects between the copper and the iron.

A sample of copper brazed to steel was secured, and after careful tests it was found that the contact between copper and steel was of negligible resistance as compared with the resistance of the copper strip. Owing to patent difficulties, it was impossible to make any arrangements with the firm supplying this sample for the use of the bond that year, but a series of experiments showed the possibility of doing the brazing by a process developed by the electricians of the company. There was not sufficient time to obtain special apparatus for doing

this work, so the electrical current needed was taken from the railroad circuit. To obtain the low voltage required, the brazing apparatus was connected in series with a generator between the circuit breaker and the negative bus of the station. The voltage of this dynamo was raised high enough to overcome the added resistance, and the generator run in multiple with the others in the power house. Several brazing contacts were in series, so that the resistance could be kept as uniform as possible, and owing to the large output of the stations the variations in the load were slight and very little was given the regulation of the dynamos used in the welding circuit. Transformers have since been obtained for doing this work, and the brazed bond has been adopted as the standard on all the heavy lines of the system. As no portable brazing apparatus had been obtained, the bond is made in two parts, and brazed on the rails before they are removed from the yard.

The shape of the bond depends on whether it is placed on the web of the rail, so as to come underneath the fish-plate, or, as they are now applied, on the base and upper flange of the rail, outside of the

*Report of the committee on track bonding, by Messrs. R. P. Brown and G. E. Chapin, Electrical Engineers, Brooklyn Heights Railroad Co., at the annual meeting of the New York State Street Railway Association.

joint plate. All forms of the bond, however, are made up of 10 or 12 leaves of $\frac{1}{4}$ in. soft copper, and the brazed contact having an area of about one square inch. Soft spelter, with suitable flux, is used in brazing the copper to the steel rail. The bond is divided longitudinally into three parts, so as to give greater flexibility. When the rails are in position, the ends of these bond leaves are interlaced and fastened together by rivets and also by solder. The length of the bond between center of contacts is five inches, and its cross section is equal to 350,000 c. m.

All the brazing of the several thousand bonds now in place has been done with a makeshift device, using methods developed entirely by the electricians of the company. License under the patents of Gen. Payne, of Elmira, and the Thompson Welding Company, has been obtained, to guard against any claim of infringement.

On account of the great number of miles of track that are rapidly being relaid, it was found to be impossible to braze bonds for all the rails with the inadequate means at hand, so the lighter lines have been bonded with the short bonds of the "horse shoe" type placed underneath the fish-plates.

It has been found that if a simple bond is used it should be placed at the center of the web of the rail if sufficient contact can be obtained at that point. If contact is made at either the base or upper flange the length of the circuit is increased by the height of the rail, and in case of the 9-in. girder the increased resistance is equal to a half of the total resistance of the bond itself. On account of the greater depth of metal it would seem advisable when two bonds are used to apply one on the top of the upper flange of the rail and the other on the base. Solid joints are very apt to break if the joint plates become loosened to any extent, and are consequently never used on special work. Contrary to the former practice of tinning the bonds and supplementary wire, the bonds and their exposed copper surface are carefully coated with an insulating paint, so that if there is any flow of the current of the track to the surrounding soil it must leave from the steel and not from the copper. This prevents the bonds being destroyed by electrolysis or other corrosive action.

The Falk cast-welded joints make the best possible electrical connection, and if care is used in the installation conductivity almost equal to the continuous rail can be obtained. The new electrically welded rail joint made by the Johnson Electric Company promises to be equally good.

To guard against imperfect workmanship a system of testing bonds has been practiced. Usually only the joints on one line of rail are tested, though in sections of high current density, as in the vicinity of power houses, the resistance of each joint is obtained. The test is a simple comparison of the fall of potential across the joint and on a measured portion of an unbroken rail. Two Weston millivoltmeters, with scales ranging from .001 to .6 of a volt, are used, the readings being taken simultaneously. Contact is obtained by pressing hardened steel points on the surface of the rails. These points are set in wooden blocks and placed six inches apart if used on the joints, and two feet apart for test on solid rail. The distance on the rail is taken for two feet instead of one foot, on account of the small amount of current flow in the rail on some of the lighter lines. These testing terminals are provided with handles of convenient length, so that the person using them can stand upright and apply the necessary pressure with one foot. Two men can test joints very rapidly with this outfit. The current density of some of the rails was too low to give reliable readings with these instruments, so a portable resistance was arranged on a wagon and the necessary current readily obtained from the trolley wires. This resistance allowed about 300 amperes to flow from the line to the rail, and as it could be very quickly applied, rendered it a comparatively easy matter to test the joints in any section of the city.

Although the bonds are less than six inches long, that length was selected for the distance between terminals of the voltmeter used in testing joints, because it gives a convenient fraction to subtract from the length of each rail in arriving at the total resistance in line of track. The drop on these six inches was considered as increasing the length of the rail by an amount proportionate to the drop in the rail itself. From this percentage that the rail of any line approached the conductivity of the solid steel rail could be easily determined.

The following results were obtained from different joints:

Falk Joint.			
Drop.	1 ft. of joint.	Per cent of Conductivity.	
1 ft. of rail. .00215	.00355 (30 ft. rail)	98	
	(60 ft. rail)	99	
Double Brazed Bond.			
1 ft. of rail. .00725	.00758 (30 ft. rail)	99.8	
	(60 ft. rail)	99.9	
Johnson Bond.			
2 ft. of rail. .00364	.00342 (30 ft. rail)	95.6	
	(60 ft. rail)	97.8	
Plate Bond.			
2 ft. of rail. .0109	.0233 (30 ft. rail)	89	
	(60 ft. rail)	94	

It will be seen by the foregoing that it is a comparatively easy matter to get a conductivity of over 90 per cent. of a continuous steel rail. As high as 600 amperes can be safely carried on any of the bonds mentioned, and the cost of double bonding in a satisfactory manner should not exceed 75 cents for each joint. The conductivity of steel varies with the amount of carbon it contains, but, generally speaking, it is about $\frac{1}{2}$ of the conductivity of commercial copper. Bearing these facts in mind, it will be readily seen that it is much cheaper to make the return circuit wholly of well bonded steel rails, supplementing the track in the vicinity of the power house with worn out rails carefully bonded.

Cost Keeping and Accounting.*

By W. S. Rogers.

We will suppose Smith goes into manufacturing, and having business sense, he carries his bookkeeping methods with him into the factory, and instead of trying to use the same methods that he did in the supply trade, he alters the plan a little to suit the conditions. He is building three styles of machines, named W, Y and Z, machine W being composed of parts a, b, c and d; machine Y, of parts e, f, g and h;

and machine Z, of parts i, j, k, l, m and n. His factory cost-books for this will consist of a day-book, which in reality is a diary of what each of his operative laborers does per day on the different machines under construction, and also hours worked per day of the co-operative labor. The latter force consists of a foreman at \$20 per week, a laborer at \$7, and a clerk at \$8 per week, and the operative force is composed of Bill Push at 15 cents, Bob Rush at 20 cents, Joe Hustle at 25 cents, and Jim Swift at 30 cents per hour. The clerk is part of the co-operative force of the factory account, but Smith and his bookkeeper and salesmen are not, and he is desirous of having an accurately honest account of what the factory production alone is.

At the end of the week the record of the day-book is thus:

Day Book.	
May 1 to 7, 1898.	
Push, No. 3/15:	
Monday, Yg/5; Zl/5.....	10 hours, \$1.50
Tuesday, Yl/3; Yl/4; Zl/3.....	" 1.50
Wednesday, Yk/4; Zn/6.....	" 1.50
Thursday, Yb/4; Yl/6.....	" 1.50
Friday, Wd/5.....	5 " .75
Saturday, We/5.....	5 " .75
Totals.....	50 hours, \$7.50
And so on for the others.	
Total for week, 215 hours,	\$48.75.
Foreman No. 1.....	\$20.00; 55 hours
Clerk No. 2.....	8.00; 55 hours
Laborer No. 7.....	7.00; 55 hours
Total.....	\$35.00; 165 hours

Rate per hour co-operative labor...\$35.00; 215 hours .163

The figure after each man's name is his number according to the time clock or register, and the figure following is his rate per hour or weekly wages. The capital letters are symbols of the machines; the small letters, symbols of parts; and the figure following, the hours worked. This record must and will easily balance with the "cash book," which is the time book kept by Smith himself in his office and taken by his clerk daily from the time register. This day-book is kept in shape daily by going to the men personally and taking it from their cards before they leave at night. I might also add that the clerk is a wideawake type of man, who is almost as familiar with the operations and work of the shop as the foreman, and who takes an interest in his work also.

Each series of machines has been given a page in the journal, each part has been itemized, and at some hour during the week he transfers from the day book to it and on Saturday it looks thus:

Journal.	
"W" 3 machines built.	
Hours, rate, amount.	Totals.
a-5/20/1.00; 6/20/1.20; 1/25; 5/20/1.00.....	17 hours, \$3.45
b-6/20/1.00; 4/20/30; 4/15/60.....	" 1.40
c-2/20/40; 4/20/30; 4/15/60.....	" 6
d-2/20/40; 5/25/1.25; 5/15/75.....	" 2.40
e-4/25/1.00; 5/25/1.25; 8/20/1.00; 5/15/75.....	" 4.60
f-6/30/1.80; 2/20/40; 2/20/40.....	" 2.60
x-3/30/90; 4/30/1.20; 1/30; 5/25/1.25; 6/30/1.50.....	" 6.15
Total.....	98 " \$22.00
And so on for the "Y" and "Z" machines.	
Total operative labor.....	215 hours, \$48.75
Total co-operative labor.....	215 " 35.00

As the machines were all completed this week and the day-book and journal have balanced with the pay roll, the next item is to transfer the accounts to the ledger for Smith's information, and the clerk, by dividing the amount of money paid for co-operative labor by the number of hours worked by the operative labor, finds the correct rate per hour to add the right proportions of it to the cost of the several types of machines built, because this rate is almost constantly varying as the operative labor loses time during the week. The ledger when it reaches Smith looks like this:

"W"	
May 7, 1898—Operative labor on 3 machines, 98 hours.....	
Co-operative labor, at .163 per hour.....	\$15.95
Material (from purchase books).....	60.85
Total.....	\$98.80
Cost 1 machine: Op. labor, \$7.33; Co. labor \$5.31; Mat., \$20.29.	

To these ledger accounts Mr. Smith adds his expense, fixed charges and sundry accounts, and also what he thinks will be enough profit (if he can get it) and theoretically fixes the selling prices, but in reality some competitor has already done that, and it is a question with Smith as to what means the foreman will take to still lower the cost of the next lot of machines, for if he is a wise man in his generation he will keep that journal constantly in mind and see if the items cannot be lowered in some way. Smith also goes over the accounts in the journal and makes comparisons with previous work, and perhaps discovers that the ledger account of machine "Z" is somewhat higher than one built a month previous, and turning to the journal for items he finds that on the piece "m," the highest rated man in the place worked for four hours at 30 cents per hour while the piece never before had a higher priced man than 25 cents on it, and he asks, "Why?" Because this man's time is always to be used on "x," which is the symbol for assembling and fitting machines together, and inquiry shows that the foreman did not have assembly work in shape for him and the man did this to get in time until the foreman was ready.

Smith can also see that he can possibly lower the cost of his machines by adding two more men to the operative force without increasing the co-operative quantity, which will also increase the output and only cause a slight increase in the weekly pay roll. Weekly comparisons also show very readily to Smith the condition of the co-operative labor, and he knows whether to increase or decrease it to make costs equalize. Should it be desired to have the cost of each operation, the journal can be subdivided to suit desire, and the calculations carried out in a similar manner.

But, with all this plainness and systematic method of keeping the cost, it is not an accurate cost until the question of hours has been eliminated from the operative labor and a price in dollars and cents put in its place. The reason is obvious. Workmen can never calculate the exact fractions of hours worked upon an item, and the nature of the materials force some work to be very slow, while in other instances it is reversed. This is a problem entirely removed from "cost keeping," but is one of the "props" that hold up the accuracy of continuous cost keeping, and is called "piece work." The problem of establishing an accurate piece price for the work done in machines and by manual work has nothing

whatever to do with cost keeping, as the writer is familiar with several plants where they have piece work in its easiest form and no cost accounting; other shops where they keep costs similar to that of Smith's, but have no prices on work, and in both instances everyone is satisfied and no alterations desired, as they are making money.

The simplest and easiest method of obtaining prices for the purposes of establishing permanent piece work rates in a shop or factory of any kind, and a practically correct cost system, is to adopt a premium method with the workmen for a few months, allowing them a fair percentage of their hour rates for the number of hours saved on their labor. When this has been carried on far enough, in the judgment of those in charge, it can be abolished and piece prices put in vogue without any trouble whatever.

In commercial manufacturing, one item that is the bugbear of the superintendent and foremen is the "fixed charges" addition to their actual factory cost of production on a piece of work. This feature varies in different shops, all the way from 15 per cent. to 150 per cent. of the actual productive figures. When it is only 15 per cent. a deficit usually exists at the end of the fiscal year, and when it is 150 per cent. there are several barnacles undoubtedly hanging around the management. The author's experience has taught him to make it 100 per cent. always, and there is a safe surplus at the end of the year in his favor. In the month of June, of this year, I would state that my fixed charges were 101 per cent., while in July they went down to 73 per cent.

With this paper are submitted several forms for keeping daily records, which the author has found of vast benefit in keeping the cost of manufacture within the bounds for earning profitable margins, and at the same time so simplified that results may be comprehended without the use of a cipher code. There is one danger to be always guarded against in this work, and that is allowing one's self to become "system crazy." Too much system is worse than no cost accounting whatever. The method of cost keeping used in the establishment now under my care is similar to that in principle used by "Smith" eighteen years ago, and it requires the partial services of a young man at a salary of \$44 per month, who is capable of watching the work of 100 operatives, and we can know the exact cost of any order in the factory and the state of completion at any time, and also the condition of any of the different expense accounts.

Stray Electric Current in New York City.*

By A. A. Knudson.

About 18 months ago the question was raised by some of the municipal officers of this city as to the possibility of electric currents leaking or straying to underground pipes from the conductors of the "open conduit" electric railroad at Lenox avenue, and adjoining streets at that time, as applications had been made to extend this system.

Previous to making any tests on the Lenox avenue line, we had a well settled theory that in a double conductor system as this is, very little, if any, of the current could be found diverted from the conductors to water or other pipes underground in its vicinity. The tests were begun on Lenox avenue, near the Metropolitan company's 146th street power station, and continued south. From the first, unmistakable signs were encountered of railroad current leakage from the rails of this road to both water and gas pipes, the sudden fluctuation of the voltmeter needle proving this beyond a doubt. It was noticed, however, that when a Lenox avenue car passed, there was no advance of the needle, as should be expected, and when two cars passed, going in opposite directions, there was no advance of the needle at the moment; continuing down the street and testing at each fire hydrant and gas post the voltage tended to increase upon nearing 135th street.

It was apparent from these tests that the most, if not all, of the leakage came from the Union Railroad Company's line, using the overhead trolley, a branch of this road running through 135th street, and thereby crossing the rails of the Metropolitan Company's tracks at Lenox avenue. This seemed the more certain from the fact that the maximum reading (% volt) was obtained when a Union Railroad car was crossing the rails at Lenox avenue, or was quite near. Further proof, however, was necessary to determine if that company was responsible for all or only a portion of this current escape; advantage was therefore taken of the period when the Union Railroad cars stopped running for the night at 1.30 a. m., to make some further tests. At this time there were no fluctuations of the needle whatever, and consequently no sign of a trolley current escape from the rails to underground pipes. . . . What we did find, however, worthy of mention, was another current, emanating from an entirely different source, passing from the water pipes to the rails, the pipes, this time being positive, which, as will be perceived, was the reverse of the polarity found during the day. This current was as perfectly steady as if from a galvanic battery. The difference of potential, however, was low, in some places $\frac{1}{2}$ of a volt only was found, while in others the reading was $\frac{3}{4}$. In my efforts to identify this current I consulted the manager of the power station which supplied power to the Lenox avenue road, and he obligingly offered to shut down the plant for half an hour during that portion of the night when traffic is the lightest and give me a chance to re-test. This was done between the hours of 2:30 and 3 a. m., when both of these electric roads were then shut down so that no possible current could come from either one. The same steady current was found, however, as before, passing from the water pipes into the rails. The voltmeter proving insufficient as a means of completely identifying this current, telephone receivers were used, and with one at each ear there was no difficulty in recognizing the familiar ring of the incandescent dynamo. This test with the telephone was repeated several times by

* From a paper presented at the 128th meeting of the American Institute of Electrical Engineers, New York, Oct. 26, 1898.

*Extracts from a paper read before the New York Railroad Club at the meeting of Thursday, Sept. 15.

my assistant and myself, so that there could be no possibility of error.

It appears from the tests made, that an open conduit system, or one in which an insulated metallic return is used, effectually confines the current to the conductors provided for it. For this reason it is preferable to the ordinary ground return, especially in large cities, where the space below the streets is so largely occupied with various lines of iron pipes, more or less subject to electrolytic action.

The distances the overhead trolley current would sometimes reach were shown by a rise in voltage when a Union Railroad car crossed the tracks of the Lenox avenue road at 135th street. This was found as far down as 116th street, where the latter road branches east and west; in fact, there was no portion of this road where these trolley current fluctuations could not be obtained when cars were passing through 135th street.

Desiring to learn the difference of potential between the elevated railroad pillars, and water pipes, with the Union Railroad, if any, in this part of the city, tests were begun at 157th street (Harlem River) on the Eighth avenue line and continued down as far as 109th street, which is the western terminus of the

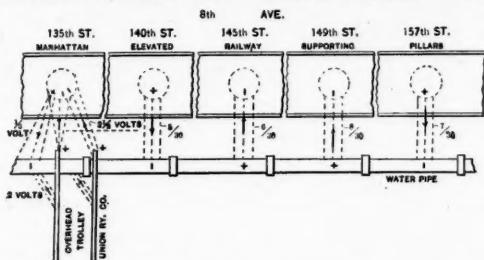


Fig. 1.—Day Tests for Stray Currents on the Manhattan Road.

Metropolitan company's open conduit system. From 157th street down to 135th street, the tests are given in the plan, Fig. 1, which gives the day tests only.

The Union Railroad (overhead trolley) heretofore spoken of as passing through 135th street, terminates at Eighth avenue; in fact, the ends of the two trolley wires of that road are supported by being attached to the L structure, which, as is well known, passes through that avenue.

The reading at 157th street shows that the night test was the same as during the day. It was afterward discovered that the last car of the Union road had not then left the track, which accounts for this reading being higher than the other, as well as a trolley variation being shown. All of the other night tests, however, showed the same indications of an incandescent current as were found on Lenox avenue, as well as at several other places. One feature worthy of notice in the day test, shown in the plan, as well as the table, is the change of polarity found at different points on this section of the road.

The cause of this erratic jumping of the railroad current up some pillars and down others may be explained in two or three ways:

(1) Proximity of water pipes to the L structure, at some points being closer than at others, offering a more favorable path for this portion of the current.

(2) The current passing into the water pipes at 135th street as well as the L structure at the same polarity, and possibly at a higher voltage at times to water may cause this change in polarity at different points along the line.

A few days ago tests were made over this same section of road with almost identically the same readings in each case as prevailed over a year ago. It was noticed, however, that the terminal rails of the Union Railroad Company at 135th street and Eighth avenue had recently been replaced by new ones, which appears to be a good illustration of "cause and effect."

Similar conditions also prevail on the section of road below 135th street down to 109th street. At this point the "open conduit" road has its western terminus. Day tests have shown a maximum reading of $\frac{1}{2}$ of a volt, the rails being positive to L pillar and to water, the night test when Union railroad was not running, steady, showing plainly that the current was from that road.

Attention is now directed to the east side of this part of the city, where another branch of the Union road is located. Tests made here show even more pronounced results than at the branch running through 135th street to the west side. It may be stated that the power station of this road is located on the Bronx River in Westchester County.

Something more than a year ago, when these tests were made, this branch had a terminus at Third avenue and 129th street, immediately in front of the L station, the cars then passing over the Harlem River at the old wooden bridge, which is now being removed. The cars now pass over the public bridge recently opened, to the new terminal at Lexington avenue. Fig. 2 shows the location of the terminal when these tests were made, as well as the difference of potential.

It will be noticed that the maximum reading here was 10 volts, rails positive to L pillar, sewer and gas. A test was also made on the Harlem bridge, which showed the same reading, except it was made to gas only, no other pipes being at hand. A few days ago this locality was visited with a view of obtaining any further items which might be of interest for this paper, and workmen were found engaged in removing the rails of this very terminal.

Information was, therefore, obtained as to the results of electrolytic action on these rails (they having been positive). An impression was taken on paper of the exact size and shape of the end of one of the four rails which composed that terminal switch, the ends of the other rails all being in just about the same condition. From the condition of these rails now, as shown in the plan view, Fig. 3, it is quite plain that a large amount of metal has been removed from them by electrolysis. The original size of the rails was furnished by the company supplying the rails, they being 70 lbs. to the yard; furthermore, the bottom sides of all these rails were cut by the current down to knife edges for several feet back from the ends. These edges were irregular in shape and somewhat jagged in appearance.

Another feature of interest is the condition of the cross-bars or tie-rods which keep the rails in position. These bars, which were originally $\frac{1}{2}$ in. wide by $\frac{3}{4}$ in. thick, were nearly all so eaten away that the

middle portion was missing, the ends protruding from the rails at from 6 in. to 12 in.

Coming down the west side of the city, I was surprised to encounter a full fledged trolley current in the extreme lower part of the city. The first intimation was found at Rector and Greenwich streets; it became more pronounced in the vicinity of South Ferry, where in testing between the rails of the Metropolitan cable road and an L pillar a variation of from $\frac{1}{2}$ to $\frac{3}{4}$ volt was found, the rails positive, and the same reading between the rails and water pipes. Just why there should be indications of a trolley current in this part of Manhattan Island was difficult to understand, but after making further tests coming up on the east side, this current was found to come from the Brooklyn bridge. Having pointed out how an overhead trolley, using the water pipes and incidentally the rails as a return, such as is operated on 135th street, can spread its influence, so to speak, for a distance of over 20 blocks in either direction north and south, through various pipes, railroad structures, etc., the existence of this current from the bridge permeating underground metals through a large portion of the lower part of the city, is accounted for.

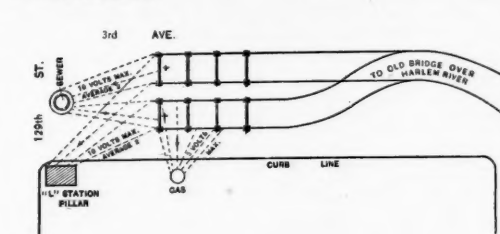


Fig. 2.—Tests in 1897 at 129th Street.

[In Fig. 4 are given the results of tests at different points on the Manhattan. The + or - at each point indicates whether the L structure is positive or negative to the water pipes or cables. The fraction in each case gives the difference in potential in volts.]

The tests were continued at the New York entrance of the bridge, and at the pillars which stand in the street just west of the Third avenue cable road. I found the readings as follows: At one pillar a maximum of three volts, average $1\frac{1}{2}$ volts, pillar positive to Third avenue cable rails.

At another practically the same reading. Further up Park row, at the corner of Chambers street, pillar positive to cable rails, 1 volt maximum; water positive to cable rails $\frac{1}{2}$ volt; pillar positive to water $\frac{1}{2}$ of a volt.

All of these tests were made nearly a year and a half ago. A few days ago, tests were made over this same ground, and at places where a difference of potential of 3 volts maximum existed at that time it is now found to be $\frac{3}{4}$ volts, pillars positive as before to rails of Third avenue cable and also to water pipes, showing in all probability that this current has been during all this time actively and unceasingly passing down the pillars which support the L station at this place, as well as the bridge crossing the street, and out from their foundations to other metals as stated, with now a fifth of a volt more for good measure.

In the light of present knowledge on this subject, the very serious question presents itself to any practical mind, in what condition would we expect to find the anchor bolts and iron foundations of these pillars, if excavations were made at their base?

In Mr. Farnham's excellent paper, read before this Institute four years ago, he showed that but a small fraction of a volt was necessary to establish electrolytic action between metals.

What, then, can be expected from an incessant action from $\frac{1}{2}$ to $\frac{3}{4}$ volts, jumping out of these foundations during the past year and a half or perhaps two years?

Further tests at the New York entrance of the bridge at pillars nearest the four loop tracks, show that they are negative to rails of these tracks with maximum voltage of $\frac{3}{4}$, an estimated average of $\frac{2}{3}$. These tests were made on three different days at different times of the day, the highest maximum reading as above being taken at 4:45 p. m.

The other tests, one made during the so-called rush hour between 5:30 and 6 p. m., where a maximum reading of $\frac{2}{3}$ volts, noted at track 1, did not vary much from the tests made in the afternoon of another day at from 2 to 2:30 p. m. at track 4, where the voltage was found to be $\frac{2}{3}$ maximum. Previous to any use of electricity for operating cars on the bridge it had been known that currents were escaping to that structure from trolley lines in Brooklyn, and passing over would find their way through the city by underground pipes, etc., and thence crossing the river back to the power station in Kent avenue.

The polarity of both of these railroad systems now operated on the bridge, indicates that these currents

escape from their lines, but it is also quite likely that currents are even now coming over the bridge as they were a year ago. Only an extended investigation would determine these points, even if it were desirable that they should be known.

Recognizing the necessity of having every detail as to the construction, location, etc., of these terminals before being able to intelligently consider the matter, plans prepared by the bridge engineers were obtained. . . . The main cables are made up of 18 strands of smaller cables, which are practically continuous, the wire running back and forth from New York to Brooklyn, passing through the holes at the ends of heavy steel bars or links at each place, and the ends of the single wire being finally fastened by a rigid screw coupling. These two rows of steel bars of nine each, which are attached to the cable strands, one row placed over the other, pass down in a graceful curve into solid stone masonry to the anchor plates, and are secured to them by heavy steel bolts passing through the eyes at the ends. The anchor plates are in a shape somewhat longer one way than the other, each being a single piece of cast-iron, weighing 23 tons.

The first test was made just over the Brooklyn anchorage, where the structure was found to be positive to the ground, with a difference of potential of $\frac{2}{3}$ volts maximum, estimated average $1\frac{1}{4}$ volts. At the Brooklyn tower another ground connection was made to a water pipe, which ran down the side of the tower, and is intended for use in case of fire on the bridge. At this point the reading was $\frac{3}{4}$ volts maximum, average $\frac{2}{3}$, bridge structure was, as before, positive. At centre of span, structure positive at first, with $\frac{2}{3}$ volts maximum, but during the readings there were two reversals, one of them only remaining long enough to obtain a reading, which was $\frac{1}{4}$ volts maximum, structure negative. At the New York tower: Structure positive to cable ground, with trolley variations ranging from $\frac{1}{4}$ to 3 volts, average 2 volts. At New York anchorage: Maximum $\frac{2}{3}$ volts, average 2 volts, structure positive to ground.

Other tests were made to determine the polarity of the rails of the bridge trains, and they were found positive to the structure, the same as the rails of the trolley road heretofore tested. Let us now consider the question of the electrolytic conditions of the cable anchorages, as this point appears to be of high importance in this matter, if not the key to the whole situation in determining whether or not electrolytic action is going on.

(1) These anchorages are composed of solid stone masonry and are put together with the highest quality of cement; there is no brick work or mortar in their construction.

(2) The 23 tons of iron composing the plates are set about 80 ft. below the top of the anchorage. The distance from the bottom of the plates to mean high water is 3 ft. 8 in. at the New York end, 5 ft. at the Brooklyn end; there is no earthy matter, salts or alkalies, such as is found prevalent in the streets which go to make up an electrolyte, so I am informed, in any part of this structure.

In view of the tests that have been made showing the structure and cables to be positive at both ends, it is quite possible that a portion of the currents straying from the trolley lines, and possibly from the bridge service, find their way out of the anchor plates through the dampness of the stone work of these anchorages. The construction of these anchorages, however, is such, as I have endeavored to set forth, that it seems reasonable from the general construction of these piers that the mass of stone and concrete surrounding these plates will not constitute an electrolyte such as would favor electrolysis, and thereby cause corrosive action on them.

One of the bridge officials informed me that a certain authority had reported that electrolysis would not attack cast-iron, consequently their cast-iron anchor plates were exempt from such danger. In the light of recent experience in other cities, that theory is now untenable.

The author of the paper then quoted a portion of the report of Mr. E. E. Brownell, giving the results of an investigation of a cast-iron pipe at Dayton, O., which showed at the point of testing nine volts positive to the rail. This pipe was laid in 1874 and the T in 1888, so that both were subjected to electrolytic action for about 10 years, and both showed marked evidence of electric corrosion. The author then calls the attention of engineers to their duty in exercising every possible precaution against the effects of this action.

Street Railroad Costs in New York.

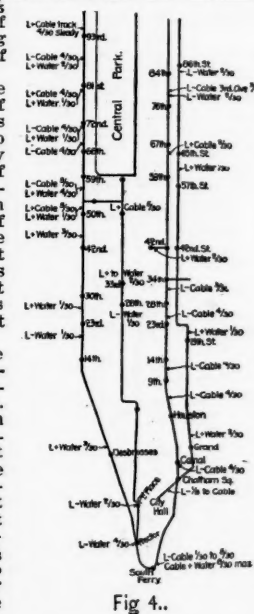
Some six weeks ago President H. H. Vreeland, of the Metropolitan Street Railway Co., put in our hands a table giving the itemized expenses of cable, electric and horse traction in New York City for the year ending June 30, 1898. At his request it has been held until the present time, but we are now at liberty to present these very interesting figures, which show at a glance the economy from actual operation of the electric cars.

Metropolitan Street Railway Company, Year Ending June 30, 1898.

Car miles run:			
Cable	11,991,000		
Electric	7,110,000		
Horse	15,995,000		
Cost per car mile in cents:			
Maintenance of way	3.54	0.33	0.72
Maintenance of equipment	0.94	0.83	0.39
Power	2.02	1.70	6.40
Transportation	7.78	6.15	8.49
General expenses	2.07	1.22	1.87
Totals	16.35	10.23	17.87

If the cable car miles had been run at the cost of the electric working the saving would have been \$745,840 in the year, or 4 per cent. on \$18,646,000. If the horse car miles had been run by electricity at the cost as given in the table, the saving would have been \$1,220,000, or 4 per cent. on \$30,500,000. It cannot be wondered at that the cable lines are being changed to electricity.

The Street Railway Journal for November gives, in addition to the above figures, the itemized amounts showing the relative cost of and profits from the three systems for the year ending June 30, 1898, and also for the three months ending Sept. 30, 1898. The electric lines during the 12 months earned 16.76



cents net per car mile, or about 1.25 cents less than the cable lines, in spite of the fact that the latter has 7.43 cents per car mile greater receipts, while for the three months' period the net earnings of the electric lines per car mile were greater than the cable lines by .25 cent and greater than the horse lines by 5.04 cents. From the quarterly report it is evident that the power for electric cars 22 to 28 ft. in length has cost less than 30 per cent. than could be done by cable power stations, which work cables so heavily loaded as to make the proportion of live and dead weight probably greater than in any cable railroad system in the country, unless it be the State street line of the Chicago City Railway Co. Our figures show that during the 12 months' period the company worked 34.2 per cent. of its car mileage by cable, 22.2 per cent. by electric, and 45.6 per cent. by horses. During the last quarter, however, the proportions were greatly changed, the cable mileage being only 27.4 per cent. of the total, the horse 33.7 per cent., while the electric had jumped to 39.1 per cent. It should be remembered that these figures are for lines in a city where the conditions are peculiarly favorable to electric traction by the conduit system.

Train Accidents in the United States in September.

COLLISIONS.

Rear.

9th, on New York, New Haven & Hartford, at Pawtucket, R. I., a freight train standing in the yard was run into at the rear by a following freight train, and one car was wrecked. The fireman was fatally injured.

11th, 4 a. m., on Missouri Pacific, near Independence, Mo., a passing train ran into the rear of a preceding freight, wrecking the caboose. A telegraph lineman in the caboose was killed and a brakeman was injured.

15th, on Pennsylvania road, near Altoona, Pa., an eastbound freight train descending a grade became uncontrollable and ran into the rear of a preceding freight, making a bad wreck, which fouled both main tracks. A westbound freight train ran into the wreck and three engines and 30 cars were badly damaged. One engineman was injured.

16th, 4 a. m., on Grand Rapids & Indiana, near Osceola, Mich., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, wrecking five cars. Two tramps were killed.

16th, on Philadelphia & Reading, near Monocacy, Pa., the rear portion of a freight train, which had been stopped in consequence of a train breaking in two, was run into at the rear by a following freight and the engine and several cars were badly wrecked. The engineman was badly injured.

16th, on Cincinnati & Muskingum Valley, at Lancaster, O., a freight train standing on the main track was run into at the rear by a following passenger train, and the passenger engine was overturned. The engineman, fireman and several passengers were injured. It is said that the freight was occupying the main track on the strength of a "report" that the passenger train was 15 minutes late.

17th, on Erie road, at Hiram, O., a freight train ran into the rear of a preceding freight, and the engine was overturned. The engineman was injured.

20th, on Union Pacific, at Alda, Neb., a freight train, which was slackening speed to enter a side track, was run into at the rear by a following freight and the engine and six cars were wrecked. The engineman was badly injured.

21st, on Philadelphia & Reading, at Williamsport, Pa., a freight train ran into the rear of a preceding freight, wrecking the engine and seven cars. The caboose and three freight cars took fire and were burned up. There was a dense fog at the time, and it is said the trains were running so close together that the brakeman of the foremost train had not time to signal the other one.

22d, on Wisconsin Central, near White River, Wis., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, wrecking a car in which a number of tramps were riding. One of these was killed and another fatally injured.

24th, 2 a. m., on Norfolk & Western, at Franklin Furnace, O., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, ditching several cars. A tramp riding in one of the cars was killed, and two others were fatally injured.

24th, on Lehigh Valley, near Quakake, Pa., a freight train ran into the rear of a preceding freight, badly damaging 16 cars. A brakeman was injured.

24th, on Grand Rapids & Indiana, near Hometown, Ind., a freight train running at high speed broke in two and the rear portion afterward ran into the forward one, wrecking eight cars. Three boys, stealing a ride, were injured.

24th, 7 p. m., on Lake Erie & Western, at Cammack, Ind., a local freight train standing at the station was run into at the rear by a following freight, wrecking the caboose. A passenger in the caboose was fatally injured.

25th, on St. Louis & San Francisco, at Monett, Mo., a freight train became uncontrollable on a descending grade, in consequence of the inability of the engineman to manage the air brakes, and collided with a switching engine in the yard. Several loaded cars were wrecked.

26th, on Toledo & Ohio Central, at Mount Gilead, O., a freight train standing at the station was run into at the rear by a following freight, and the engine and several cars were wrecked. The wrecked cars took fire, and with a bridge on which the collision occurred, and a highway bridge near by, were burned up.

27th, on Baltimore & Ohio, near Taylorstown, Pa., a freight train broke in two and the rear portion afterward ran into the forward one, and 12 cars were badly damaged. A tramp was injured.

29th, 4 a. m., on Philadelphia, Wilmington & Baltimore, at Wallingford, Pa., a freight train standing at the station was run into at the rear by a following freight, and the engine and several cars were wrecked. The engineman was killed. It is said that a flagman had gone back from the standing train, but that there was a dense fog.

29th, 5 a. m., on Northern Pacific, near Maywood,

Wash., an empty engine ran into the rear of a preceding work train, wrecking three cars. The engineman of the empty engine jumped off and was killed.

29th, on Union Pacific, Denver & Gulf, at Eastonville, Col., a passenger train ran over a misplaced switch and into a work train caboose standing on the side track, wrecking the caboose. One employee was injured.

And 24 others, on 19 roads, involving 2 passenger and 36 freight and other trains.

Butting.

1st, 7 p. m., on Lehigh Valley, near Half Acre, N. Y., butting collision between passenger trains No. 1 and No. 126. The engineman of No. 1 was killed. It is said that No. 126 was wrongfully running on the time of the other train.

14th, on Denver & Rio Grande, at Belden Switch, Col., butting collision between an empty engine and a freight train, badly damaging both engines. One of the firemen was killed and the other fireman and one engineman were injured.

16th, on Denver & Rio Grande, near Colorado Springs, Col., butting collision of empty engines, one of which was running backward. Both engines were running fast and the wreck was complete. One fireman was killed and the other fireman and both enginemen were injured. It is said that the train dispatcher gave conflicting orders.

19th, on Central of New Jersey, at Newport, N. J., a freight train standing at the station was run into at the front by an empty engine, and both engines were wrecked. A boy on the empty engine was badly injured.

20th, on Baltimore & Ohio, at Germantown, Md., a freight train descending a grade became uncontrollable and ran into the head of a passenger train standing at the station, badly damaging both engines. Two trainmen were injured.

20th, on Baltimore & Ohio, near Washington, Pa., butting collision between a passenger train and a freight, badly damaging several freight cars. The engineman of the freight was injured.

24th, on Union Pacific, near Cheyenne, Wyo., butting collision between an empty engine and a freight train, badly damaging both engines. One fireman was injured.

27th, on Oregon Short Line, at Grace, Idaho, butting collision of freight trains. Conductor and one brakeman injured.

29th, on Baltimore & Ohio Southwestern, near Dillsboro, Ind., butting collision of freight trains, badly damaging both engines and several cars. Three trainmen were killed and two trainmen and a tramp were injured. It is said that one of the trains ran past Dillsboro contrary to a telegraphic order which had been delivered to the conductor and the engineman.

30th, 6:20 p. m., on Fall Brook road, near Linden, Pa., butting collision between a northbound and a southbound freight, one engine being overturned and three cars being damaged. One engineman and one fireman were injured. It appears that the southbound train disregarded signals on a northbound train, which indicated that a second section was following. The error was discovered before the collision occurred, but not in time to get the train back into the siding.

And 20 others, on 16 roads, involving 9 passenger and 31 freight and other trains.

Crossing and Miscellaneous.

6th, on New York, New Haven & Hartford, at Whittenton Junction, Mass., collision between a passenger train from Boston and one from Mansfield at the junction of the two lines, the engine of the former rolling over the smoking car of the latter. One passenger was killed, and 12 passengers and 2 trainmen were injured. The Mansfield train fouled the track of the other train without first getting a clear signal. It appears that the semaphore lamp was not alight, and the engineman mistook the lamp on a highway crossing gate, which was being lowered, for a hand-motion go-ahead signal from the signal cabin. This collision was reported in the Railroad Gazette of Sept. 30, p. 711.

11th, on Pennsylvania road, near Jersey City, N. J., collision between the Chicago limited express, eastbound, and an empty engine of the New York, Susquehanna & Western (a tenant road), which was crossing the main track. Both engines were badly damaged, and the tender of one of them was overturned. A passenger conductor, riding on the empty engine, was killed and one engineman was injured.

13th, on New York Central & Hudson River, at Utica, N. Y., several cars in a freight train, which was being switched, were crushed by being thrown together at high speed, and one of the cars, loaded with oil, exploded, presumably in consequence of the dropping of a lantern by a brakeman. A brakeman was badly burned.

17th, 4 a. m., on Baltimore & Ohio Southwestern, at West Loveland, O., a fast newspaper train ran into the rear of a freight which was entering a side track, but had not fully cleared the main line. The engineman and fireman jumped off and were injured.

19th, on Louisville & Nashville, near Clarksville, Tenn., collision between an empty engine and a work train, badly damaging the engine and two cars. The engineman was fatally injured and four other trainmen were hurt.

20th, 2 a. m., on Atchison, Topeka & Santa Fe, at Kansas City, Mo., collision between a switching engine drawing empty passenger cars and a freight train, wrecking several cars. The engineman was injured.

20th, at Brooklyn, Ill., collision between an engine of the Louisville, Evansville & St. Louis and an engine of the Chicago & Alton; one fireman was badly injured. There was a dense fog at the time.

21st, 5 a. m., on Missouri Pacific, near Kansas City, Mo., passenger train No. 9 ran into a switching engine which had been run upon the main track without the protection of a flag, and both engines were damaged. Three trainmen were injured. There was a dense fog at the time.

23d, on Santa Fe Pacific, at Needles, Cal., collision between a freight train and a switching engine; one engineman and one fireman injured.

25th, on Pennsylvania road, at Bryn Mawr, Pa., a freight train ran through a cross-over track and into the side of another freight, wrecking 15 cars. Two trainmen were injured. It is said that the train which was at fault ran past a distant and a home signal which were against it.

30th, 9 p. m., on Pennsylvania road, near Jeannette, Pa., a freight car which had run out of a side track unattended, collided at high speed with an east-bound passenger train. The car was wrecked and the engine was badly damaged. The fireman was

injured. The runaway car was one of 12 which had been standing on a side track at Radebaugh; in some way the cars started down grade toward the main track and they were derailed at a derailing switch at the end of the siding, but the first car ran along to the frog end and was there re-railled and thus was free to run out on the main track. The other 11 cars were ditched by the derailer.

And 14 others on 13 roads, involving 2 passenger and 20 freight and other trains.

DERAILMENTS.

Defects of Road.

None involving injuries to persons. Of others there were 6; all freight trains.

Defects of Equipment.

1st, 2 a. m., on Cincinnati, New Orleans & Texas Pacific, near Pine Knot, Ky., a freight train was derailed by a broken wheel and 6 cars were wrecked; one brakeman was killed.

2d, 3 a. m., on Georgia Railroad, near Buckhead, Ga., a car of a freight train broke down and, with six other cars, was badly wrecked. Three brakemen were injured.

2d, on Central of New Jersey, at Asbury, Warren County, N. J., a freight train was derailed by a broken axle and several cars were wrecked. Two men stealing a ride were killed.

14th, on Atchison, Topeka & Santa Fe, near Quenemo, Kan., the locomotive of a freight train was wrecked by the explosion of its boiler, and the first two cars of the train were derailed and badly damaged. The fireman was killed and the engineman and one brakeman were badly injured.

15th, on Chicago, Burlington & Northern, at Trempealeau, Wis., a freight train was derailed by a broken wheel and six cars fell into the river. A tramp was killed.

25th, on Nelson & Fort Sheppard, near Northport, Wash., the engine of a passenger train was derailed by a broken flange. A passenger jumped off and was injured.

And 14 others on 12 roads, involving 3 passenger and 11 freight and other trains.

Negligence in Operating.

5th, on Erie & Central New York, at McGraw, N. Y., a passenger train was derailed at a misplaced switch and the engine and tender were overturned. The engineman and fireman were injured.

5th, 11 p. m., on Washington Southern, at Washington, D. C., a freight train was derailed and the engine overturned. It appears that at the eastern end of the bridge across the Potomac River, the train ran over a misplaced facing point switch and upon a track used for street cars (the street cars use the Washington Southern's track across the bridge). The signalman at the switch appears to have been inexperienced and the engineman of the freight appears to have failed to properly control his speed. The fireman and one brakeman were killed and the engineman was badly injured.

9th, on Central of Georgia, at Lovejoy, Ga., a passenger train was derailed at a misplaced switch and the engine was ditched. Two mail clerks were injured.

15th, on Atchison, Topeka & Santa Fe, near Cimarron, Kan., a freight train was derailed at a misplaced switch and the engine and six cars were ditched. The fireman was killed.

26th, on Missouri, Kansas & Texas, near Colbert, Tex., a sleeping car in passenger train No. 1 was derailed at a point where the track was undergoing repairs and fell over into the ditch. Three passengers were injured.

And 3 others on 3 roads, involving 2 passenger trains and 1 freight.

Unforeseen Obstructions.

1st, 5 a. m., on New York Central & Hudson River, near Fulton, N. Y., passenger train No. 5, running at high speed, was derailed by the misplacement of a switch which threw the train upon a side track in which the curve was too sharp for a train running fast. The tender was overturned and the first two cars were badly damaged. The engineman, fireman and one brakeman were killed; 10 passengers and one trainman were injured. It is believed that the switch had been maliciously misplaced.

5th, 2 a. m., Lake Erie & Western, near La Porte, Ind., an excursion passenger train was derailed by sand which had been washed upon the track, and the engine and first two cars were overturned. The engineman and baggage men were injured.

10th, on Chicago, Burlington & Quincy, at Tyrone, Ia., a freight train was derailed by running over some cattle and the engine and 12 cars were wrecked. The engineman and fireman were killed and a brakeman was injured.

10th, on Union Pacific, Denver & Gulf, near Apache, Col., a freight train was derailed by running over a cow and the engine and nine cars fell down a bank. The engineman was killed and the fireman and one brakeman were badly scalded.

12th, 3 a. m., on Texas & Pacific, near Sulphur, Tex., passenger train No. 4 was derailed at a wash-cut and the engine and four cars were ditched. One passenger was killed and two passengers and one trainman were injured. The washout is said to have been caused by a cloudburst, the track walker having been over the road only a short time previous.

16th, on Denver & Rio Grande, near Sapinero, Col., a train of empty passenger cars was derailed by a landslide and the engine and one car fell into the Gunnison River. The conductor and engineman were killed and a brakeman was injured.

25th, on Iowa Central, near Eldora, Ia., a freight train was derailed by running over cattle and seven cars were wrecked. The fireman was killed.

26th, on St. Louis, Iron Mountain & Southern, at St. Louis, Mo., a passenger train was derailed by a spike which had been placed on the track, presumably by boys.

A moment later a freight train ran into the rear of the passenger train.

29th, on Pennsylvania road, near Altoona, Pa., several cars of a freight train were derailed by running over a cow. A brakeman and a man riding on a coal car were killed.

30th, on Chicago, Milwaukee & St. Paul, near Savoy, Wis., a work train running backward was derailed by running over a cow and three cars were ditched. Two employees were killed and another was injured.

Unexplained.

3d, on Philadelphia, Wilmington & Baltimore, at Edge Moor, Del., two cars in a freight train were derailed and overturned. The conductor was injured.

9th, on Philadelphia & Erie, at North Bend, Pa., a

passenger train was derailed and the engine and baggage car were ditched. The engineman was killed and four other trainmen were injured.

11th, on Rio Grande Western, at Crevasse, Col., a freight train entering a side track was derailed, and a passenger train which came along a moment later was damaged by scraping against the corner of one of the derailed freight cars. The windows of the passenger cars were nearly all demolished and the cab of the locomotive was wrecked. The engineman was injured.

21st, on Delaware, Lackawanna & Western, near Savona, N. Y., a car in a freight train was derailed and fell against another freight train running in the opposite direction on the adjoining main track, making a bad wreck, in which 30 cars were piled up. One brakeman was injured.

21st, on Cincinnati, Hamilton & Dayton, at Leipsic, O., a freight train was derailed at the crossing of the Detroit & Lima Northern and the engine and 14 cars were ditched. The engineman and one brakeman were killed and the fireman was injured. The engine appears to have jumped the track at the frogs. A careful investigation has been made, but the cause has not been discovered.

22d, on Atchison, Topeka & Santa Fe, near Ellinwood, Kan., a car in a passenger train was derailed and overturned and the conductor was injured.

25th, on Norfolk & Western, at Wilsendale, W. Va., a train carrying a circus was derailed and several cars were wrecked. Two circus men were injured, one of them fatally. A car containing elephants rolled down a bank, but the animals came out unharmed.

25th, on Mobile & Ohio, near Hodges Park, Ill., a freight train was derailed, and a bridge carpenter riding in the caboose was killed. Three other employees were injured.

26th, on Houston & Texas Central, near Corsicana, Tex., passenger train No. 2 was derailed on or near a trestle and two passenger cars fell into a creek. Thirteen passengers were injured, one or two of them fatally, and the Division Superintendent and the Division Freight Agent of the road were badly hurt.

And 29 others on 29 roads, involving 2 passenger and 28 freight and other trains.

OTHER ACCIDENTS.

28th, on Wabash road, near Wea, Ind., the engine of a freight train was wrecked by the explosion of its boiler and several cars were badly damaged. The engineman was killed and the fireman was injured.

30th, on International & Great Northern, near Willis, Tex., a number of empty stock cars, said to be pretty old, which were in the middle of a long freight train, were crushed by the too sudden application of the air brakes, the rear part of the train crowding upon the forward part.

And 2 others, involving 1 passenger train and 1 freight.

A summary will be found in another column.

Wood's Improved Passenger-Car Gate.

The R. Bliss Mfg. Co., of Pawtucket, R. I., which for many years has made a gate for passenger car platforms, which is in use on many railroads and which was described in the Railroad Gazette, with drawings, March 18, 1892,

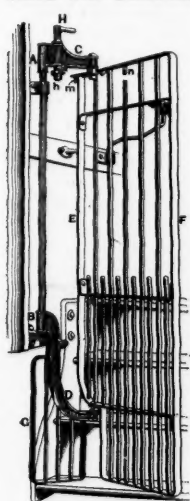


Fig. 1.

Fig. 2 shows cars of the Chicago & West Michigan. Fig. 1 is made from a small model and shows a gate standing half way between the open and the closed position. The whole gate is supported by the vertical rod A B, turning in suitable brackets. The main part of the gate hangs on the straight arm C at the top and on the curved arm D at the bottom, the outer ends of these arms forming swinging supports. A part of the lower end of the gate, G, is immovably fixed to the curved arm D. A person standing on the car platform and desiring to open the gate releases the latch H and pushes outward on the left side (F) of the gate. The other side, E, moves inward, so that when the gate is fastened open, as in the right hand view shown in Fig. 2, the lower part G is folded behind the main part. When the gate is closed, as in the left hand view, Fig. 2, this separate lower part closes that portion of the space opposite the lower step which the main part of the gate leaves unprotected.

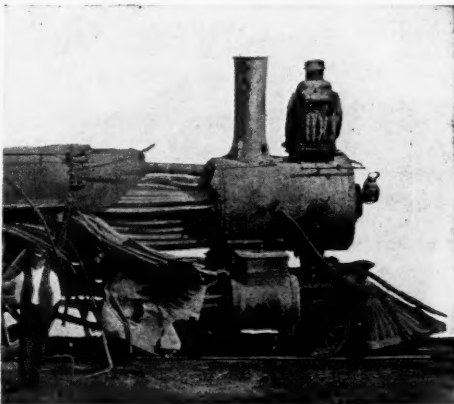
The frame of the gate is made of iron $\frac{1}{2}$ in. x 1 in., with rounded edges, and the round vertical rods are $\frac{1}{2}$ in. in diameter. The extreme height of the gates shown in Fig. 2 is 5 ft. 9 $\frac{1}{2}$ in., and the width 1 ft. 11 $\frac{1}{4}$ in. The portion of the main gate at the bottom, which is made narrower so that it can swing clear of the second step, is 17 $\frac{1}{2}$ in. wide. The small section G, is 8 $\frac{1}{4}$ in. wide.

The older form of gate made by the R. Bliss Mfg. Co. is now in use on the cars of a large number of street as well as steam railroads, including the West End of Boston, the Brooklyn Heights, Brooklyn, N. Y.; the Third Avenue, New York city, the St. Louis & Suburban, St. Louis, Mo., and the Akron, Bedford & Cleveland.

A Locomotive Boiler Explosion.

The accompanying engraving and the report giving the physical properties of the boiler plate present some particulars of an interesting locomotive boiler explosion. A brief statement of the conditions at the time of the accident and a note on the investigation to determine its cause are worthy of record, but, unfortunately, only make the cause of the accident the more mysterious.

The locomotive was made by a reliable company,



A Locomotive Boiler Explosion.

and up to the time of the explosion had run 467,330 miles. The following is a record of test of the gage used on the locomotive, immediately after the explosion. The test was carried to the pressure at which the safety valves were set. It should be stated, however, we have no means of knowing what the boiler pressure was at the time of the accident, except that it was lower than the safety release pressure.

Test gage.....100 105 110 115 120 125 130 135 140
Locomotive gage..102 $\frac{1}{2}$ 107 110 117 123 128 132 $\frac{1}{2}$ 137 141

Specimen.	Size, in.	Area, sq. ins.	Elastic limit, lbs.	Elastic limit per sq. in., lbs.	Ultimate strain, lbs.	Ultimate strain per sq. in., lbs.	Elongation in 8 in.	Elongation per cent. of length.	Size of reduced section, in.	Area of reduced section, sq. in.	Per cent. of reduction.	Remarks.
1	1.979 x .372	.7362	29,009	39,390	40,800	55,420	1.51	18.87	1.502 x .220	.3436	53.3	Middle break.
2	1.984 x .366	.7659	32,800	42,830	43,670	57,020	.87	10.87	1.570 x .244	.3833	49.7	End "
3	1.989 x .372	.7400	31,200	42,160	43,500	58,780	1.01	12.62	1.543 x .214	.3302	55.4	Middle "
4	1.995 x .375	.7481	24,600	32,880	44,190	50,060	1.72	21.50	1.531 x .225	.3445	53.9	" "
5	1.984 x .366	.7262	39,300	54,120	46,510	64,050	.82	10.25	1.595 x .241	.3844	47.1	" "

A 3-in. muffler safety valve and a Richardson valve without the muffler were both shown to be reliable. One pop blew off at 135 and the other at 138. Both were in full blow at 139. The failure occurred by the rupture of a plate along the line of rivets at the longitudinal joints in the first course, as seen in the

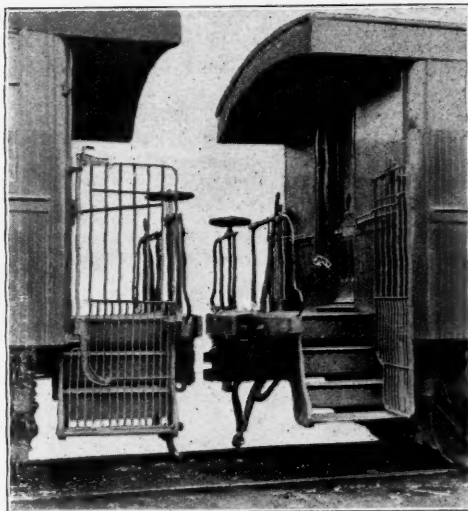


Fig. 2.—Wood's Passenger-Car Gate.

illustration. This sheet unwound, the sheet tearing along the lines of rivets at its circumferential joints. Three rivets only were broken or sheared. The factor of safety at the longitudinal joint of the barrel was 4.5. The test pieces from the displaced sheet were found by etching and physical tests to be laminated at the point of fracture. The table is a copy of the report of tests on five specimens of boiler plate removed from the locomotive. The test was made by Richlé Bros. Testing Machine Co., of Philadelphia.

Regulated Pooling.

Rate wars by rail have usually been the outgrowth of periods of depression in the transportation industry. The traffic which is now moving and which has been moving during the period subsequent to the harvest of 1897 is unusually abundant; at normal rates it would furnish an exceptionally satisfactory excess of earnings over expenses. Yet there is ample evidence of a condition of demoralization in rates scarcely paralleled in the history of American railroads, and a sacrifice of revenues which must result seriously to all interested in the permanent prosperity of the business of transportation.

This demoralization in rates may be traced, first, to the prohibition of pooling, which was forced into the Interstate Commerce law by a minority, against the protest of nearly every intelligent business man and student of transportation; and, second, to the growing disregard of the other provisions of the same law, attributable to the numerous disagreements between the Commission and the Federal courts in regard to the powers delegated to the former and the general interpretation of the statute, and to the interpretation of the Anti-Trust law by the United States Supreme Court, in the Trans-Missouri case. These conditions have culminated, eleven years after the enactment of the Interstate Commerce law, in a situation satisfactory to no one, unless it be the trusts and industrial combinations, which are said to profit largely by the concessions in rates which they are able to wrest from reluctant railroad officials.

This situation demands and indicates a remedy. Demoralization being plainly caused by competition, such competition should be eliminated. The only means for its elimination which has the present support of any considerable portion of the people is the equitable distribution of common traffic. This means a restoration of pooling, but it is within bounds to assert that in whatever form pooling may be permitted in the future, it will be supervised by Federal authorities, and the contracting parties will be required to observe their agreements exactly as other legal contracts.

All intelligent students, all honest railroad owners and officials, and all shippers who are not and do not hope to be the beneficiaries of unjust discriminations, unite in desiring an amendment to the Interstate Commerce law which will permit pooling upon

these terms. The only opposition comes from a small group of shippers whose control of a vast traffic enables them to dictate terms to carriers and secure advantages in competition with their rivals in business which they would not have if rates were uniformly and fairly maintained, and from a portion of the public, of decreasing number, whose prejudices against anything to which the term monopoly is applied, have been operated upon by demagogues acting in the service of the first group of opponents.

The opposition would have been incapable of postponing so long the enactment of a satisfactory amendment to the Interstate Commerce law, had it not been reinforced by many earnest advocates of pooling, who object to the degree of public supervision and regulation which, it has for some time been apparent, must be provided for in any measure permitting pooling, in order to permit the latter to receive the sanction of Congress.

The friends of the Interstate Commerce law, yielding nothing as to the original and permanent necessity of Federal supervision of the relations between railroad corporations and the public, admit the unwisdom of the anti-pooling section, but assert that the evils now existent are not attributable wholly to that provision, but equally to other defects in the law. These defects arise, they allege, from the failure of Congress to provide, what the general public and some, at least, of its members supposed it had provided, in the way of machinery for the enforcement of the law and the prevention of unjust discriminations in charges. It seems to them reasonable, therefore, to demand that any amendatory legislation shall aim to correct all of the more serious defects in the law, and shall not be confined to the reversal of the legislation in regard to pooling. They are inclined to be the more strenuous in this demand because they believe that they have sufficient historical evidence of the ability of railroads to maintain a merely negative position in regard to proposed legislation, to justify the conclusion that whatever defects are left unremedied when the anti-pooling provision is eliminated will long remain uncorrected.

(Continued on page 799.)



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

The report of the Massachusetts State Railroad Commissioners on the collision at Whittenton Junction, near Taunton, Sept. 6, which is summarized in another column of this issue, is, in two particulars, like the English Government accident reports; it deals with a railroad which is duly equipped with fixed signals and it gives evidence that a thorough and intelligent investigation has been made. In this case, as so often occurs, any one of three things would have prevented the disaster: (1) Careful location of the crossing gate, or a screen to hide its light; (2) the use of a green light for all-clear at the semaphore; (3) a derailing switch. The first remedy will undoubtedly be applied at once, if it has not already been applied. It is not true that "the state of the art" of signaling is at present so far advanced that a court would hold the non-use of a green semaphore light to be negligence; yet the general introduction of green lights in England and Scotland during the past five years, and the favor with which they are viewed by many of the best signal authorities in this country, raises a strong presumption that the second is the simplest remedy. The general substitution of green lights for white would cure many minor difficulties. The third remedy, a diverging switch, is also one which no outsider can say is imperative, especially where the local conditions as to ditches and adjoining tracks or buildings are not known; yet this device is finding increasing favor, and a junction like that at Whittenton is an ideal place for it, judging by the published description.

It seems to us that the Commissioners are pretty lenient with the engineman in this case. Unless the gate was stopped in its downward course, lifted a little, and then again lowered, the movement of the lantern must have been wholly down, and not "up and down," as the reports say. (The Commissioners use the phrase "up and down"); so that it is difficult to believe that Bourne saw any motion which could be legitimately taken as a hand motion signal, such as is required by the rule. In point of fact such a signal, under such circumstances, would naturally, and almost invariably, consist of several short up and down movements, so that to accept one alone as a safe signal seems like jumping at a conclusion in a very hasty manner. The Commissioners deplore the excessive caution which led Bourne to stop opposite the tower to make inquiry, and they say that he ought to have realized that the other train was due and might run into him. It is true that this was a manifestation of poor judgment; but it is questionable whether such caution ought to be found fault with. One of the hardest things to inculcate is a habit of caution which shall stand by a man in all emergencies, and to foster this habit it is highly desirable to let the engineman feel that it is always safe to stop. It is true that he must make exceptions to this rule; and when one does make an exception, and thereby avoids a dis-

aster, it is proper to praise him; but the best way to train enginemen to give implicit obedience to fixed signals is to relieve them as much as possible from the feeling that, besides heeding the signals, which ostensibly protect them from other trains, they must consider what trains they are being protected from and what minute such trains will reach the fouling point. The habit of looking out for other trains, and depending upon one's vigilance in this, weakens the habit of depending fully on the signals given by the signalman.

Specifications vs. the Reliable Manufacturer.

At the last meeting of the New York Railroad Club Mr. Hodges, of the Long Island, presented a paper on the duties of the purchasing agent, and especially discussed the question of purchase by specifications and tests. An abstract of this paper appeared in our last issue. The position taken by Mr. Hodges, very briefly stated, is that the best is the cheapest, and that the surest way to get that which is best for the purpose is to buy on "rationally constructed specifications," with systematic inspection and testing. This position is developed and supported by a well-constructed argument. The opposite position is that often taken by correspondents in our columns, namely, that it is better to choose a reliable manufacturer, and trust him and leave him unhampered by specifications. This argument was well presented by Mr. Hubbell in our issue of Aug. 19.

It is quite obvious that within certain limits, and as a matter of actual practice, both parties may be right. The value of specifications depends upon who makes them. Specifications are not good merely because they are specifications, nor even because they are the result of long and careful study; on the contrary, such specifications may be bad. We remember to have heard Professor Hadley, in debate, make the point that poker is a particularly dangerous game, because it is such a good game. Just so, specifications may be very bad for our purpose, because the general principle is so good. Even specifications prepared with great care and study may be bad, and even if they are "rationally constructed" the plan may fail for want of competent inspection and tests. We can all remember instances of such failures in very carefully constructed specifications in their practical application, and these failures have prejudiced many men against engineering bureaus in general—unjustly and illogically, but the prejudice exists.

But, on the other side, the plan of buying of reliable makers is also subject to error and abuse. Who is to choose the reliable maker, and how? The tests of actual service are long and costly, and frail humanity is subject to a great variety of influences. A generous and honorable friendship may affect our choice, and so may "the crafts and assaults of the devil," not to mention "envy, hatred and malice."

As a matter of daily practice, both sides may be right and both may be wrong, but when we seek for a philosophical and enduring basis on which to rest our practice the specification men have the best of the argument. Their plan is scientific, and it enlarges the field of competition and it gives the reliable manufacturer all the chance that he would have under the other plan, and it relieves him from the fictitious competition of the quack, the briber and the entertainer; or, more accurately, the plan will do this when carried to its proper logical end.

Obviously, to accomplish all this, specifications must be really scientific; they must embody not only the knowledge of the chemist and of the engineer of tests, as acquired in the study and in the laboratory, but also the knowledge of actual experience with the material, and, further, the wisdom of the man who has looked on all sides with the simple purpose of discovering what is so.

Of course, no man with actual experience expects to arrive at ideal specifications all at once, nor would he expect very often to find a manufacturer who would supply skill, experience and honesty, and who would act not only as his merchant but as his consulting engineer, and do all this for a fair commercial profit. To sum up, we judge that as a matter of daily practice Mr. Hodges is right and Mr. Hubbell is right, depending upon the circumstances of the case; but we judge also that in providing a basis for general use Mr. Hodges is right. But later on in the history of the race, when all men are good, Mr. Hubbell will be right.

The Joint Traffic Association.

The Joint Traffic Association has made history. It is true that its doings may not fill the most important page in the annals of the American traffic world for the last quarter of the century, and there

are questions which many people hoped it would settle, but which it did not. The hard fact that each traffic manager has to keep constantly in the center of his mental vision the question of the present earnings of his own road, and consequently dares not put much trust in what the competitive situation may promise to give him two or three months in the future, is as hard as ever. But the project was carried out, on the original plan, far enough to prove that there was a distinct value in a continuous conference; in a means by which responsible officers of competing roads could always conduct all their rate discussions face to face instead of at arms' length. Regular and frequent meetings, attended by officers with power to act, tend to promote fair dealing; without frequent meetings secret methods flourish and suspicion is fostered. It is true that the Association continued in this good state only a few months, but those few months proved the soundness of the theory on which the Board of Managers was formed; the theory that every interested competitor should always be on hand to explain his acts in the past and to avow his intentions for the future.

It seems to be hard for editors and Congressmen to realize that the inability of rival railroads to rationally adjust their differences is largely due to the fact that each officer is from 100 to 500 miles away from his several competitors, and has to frequently discuss by letter or telegram important matters which ought to be made the subject of general conferences; but such is the fact; and nothing is truer than the statement made by Mr. Caldwell, at Detroit, before the passenger agents (Railroad Gazette, October 21, p. 761) that:

"Traffic associations are chiefly useful in developing and bringing to the surface the actual conditions which exist as between competing lines. This contributes to open, straightforward dealing. Secrecy promotes evil, while evil uncovered is half destroyed, and it usually vanishes whenever the light of day is turned upon it. Second in benefit is the persuasive and restraining influence derived from joint conference. Conclusions and adjustments are usually reached based upon frankness, fairness, equity and broad-minded consideration, and which can only be developed and find their best expression in close and intimate personal association. The foundation of successful association work seems to be a bringing together of men whose environments all tend to separate them, and a developing in their relations with each other of all their better quality of mind and heart; in a word, a constant inspiration to sincerity, to joint instead of individual action, to breadth of vision, to unselfishness of purpose, to all higher standards of business methods."

Perhaps the only explanation of this is that traffic officers are human, and shortsighted, insufficiently gifted with the power of learning from experience; but the fact remains that suspiciousness seems to be the normal state of mind of four traffic officers out of five. True, the traffic man is no worse in this respect than many men in other lines of business, but he is more exposed to the "glare of publicity." Whatever the cause, it seems that the only way that some traffic men can bring themselves to live up to an agreement with a competitor is to make the agreement in the presence of a large company of witnesses, as in a general meeting. And even such public agreements do not long retain their vigor. The full and free conference is not the only thing necessary; the frequency of the conferences is also an essential element. With a hundred soliciting agents in the field every day, questions affecting thousands of dollars of earnings arise almost constantly.

The Joint Traffic Association began its operations January 1, 1896. Rates had been long demoralized throughout the companies' territory. At once all reports of irregularities ceased and the officers of every interested road expressed satisfaction with the new scheme. As we said on April 3 of that year, in discussing the Brown decision (compelling witnesses to testify against their will), the law-abiding traffic officers had for once got the upper hand. They were either compelling the rate cutters to adopt open and fair methods or else were themselves so strongly united that they could afford to ignore a little cutting. The nine principal interests in the Association had nine individual representatives on the Board of Managers, and each one had virtually complete control of rates on all the roads that he represented. Thus any representative fearing that one of his big shippers was being drawn away by a competitor, could get a true answer to his inquiry on the subject if he brought it before the Board the next morning. With meetings every day, at which were present men who, collectively, knew just what rates were in effect on competitive traffic in all the vast territory covered by the thirty-two companies' lines, there was thus accomplished what had always been deemed an impossible thing. Reductions in rates made necessary by legitimate conditions were promptly made, but not until after conference with competitors; and demands for unreasonable reductions could be re-

sisted, because a member receiving such a demand was not worried by fear of secret action by a competing road.

But this good state of things did not long continue. In a few months there was a change on the Baltimore & Ohio, and that road went into the hands of receivers. Reports of secret cuts became common, and it was evident that there was a leak in the ship. The directors of the B. & O., who had formally agreed to the rules of the Association, were dispossessed of their property, and the receivers who took charge of it were not bound by the rules. But the representative of the road continued to sit in the Board, without any formal change in his status. No proof has ever been published that the B. & O. started the disruption of the Association, but the explanation which we are here giving was published at the time and not denied; and one of the receivers practically admitted the cutting, offering in defense only the statement that the other roads admitted themselves to be as bad as the B. & O.

Of course, as soon as any road began cutting, its representative in the Board of Managers had to begin to fortify himself with a suitable supply of ignorance; and gradually all the members thus became, as far as maintenance of rates was concerned, mere figure heads. They might just as well have remained at home as to spend their time in New York. But in spite of this deplorable outcome, the Association lived long enough, in its first estate, to prove the very great value of a permanent Board of Conference composed of men possessing real authority over all the rates on their respective roads. Only by taking this authority away from the representative (or keeping him away from the meetings) could a road avoid giving frank answers to any questions concerning rates presented by its fellow members.

It is possible that this one fundamental idea can be availed of even now, in spite of the anti-trust law, if the roads desire to maintain rates. That law forbids agreements, of every name and nature, that tend to regulate competition. But the essential thing that we have been describing is not agreement, but merely setting forth facts. Competing railroads do not have half so serious trouble in agreeing as they do in getting at the hidden facts on which the agreement ought to be based. Some traffic men of experience think that the ten managers ought still to be able to do valuable work as conferees (as indeed they have done during the year and a half that they have continued to act since the original spirit of the Association vanished). Having thoroughly discussed the reasons for and against a change in an important rate, say on grain to the seaboard, getting out all the facts, each individual could state what he proposed to do, and he could modify his position if he chose, and restate it, after hearing the statements of the others. Whether such conferences would steady rates materially can be learned only by trial. As we have said, the plan is approved by men of experience, but we confess that we shall want to see it tried before we build much hope on it.

That condition—"if the roads desire"—to be square with their competitors, is the crucial point. If they are all willing to put up with their respective reasonable shares of 100 per cent. of the competitive traffic, instead of demanding such a percentage that 125 per cent. will be needed to go around; if every traffic manager will be content in dull times to put up with a moderate share, repressing the feeling that he can by putting forth his best efforts and working his slyest tricks get more than his share, something may be done. The agreement of 1896 seems to have broken down because one road concluded to try to get all it could by its own individual efforts, instead of attempting to convince its competitors, by open discussion, that it was not faring as well as it ought to. Is there any better chance, now, that there will not be one out of ten that will be untractable? The fact is, that even with the best intentions, the traffic problems in this great territory between Chicago and St. Louis on the West, and the Atlantic seaboard on the East, are always exceedingly perplexing, and perhaps often unsolvable. It requires so much grit for a freight man to accept ten per cent., when he wants eleven, that if at last he does finally reach the decision to do such a disagreeable thing, he disguises his act as much as possible by arranging to have the decision issued by a board of arbitrators, or by some man or men other than himself. It often takes a big man to surrender, even where the surrender is honorable, and big men are not found in all traffic offices.

And this leads to the consideration of what is perhaps the most permanent underlying fact in the whole traffic field which is here under review, the fact that sharp competition seems often to be inevitable. To make an agreement regulating rates on an

export commodity which may start from Cincinnati, Duluth, Grand Island, St. Louis or Milwaukee, and which may go via Montreal, Galveston, New York or Savannah, is likely to be an impossibility. You are not merely trying to make a rope of sand; you are trying to braid together three or four such ropes, and you have to assume that each one will stand alone while you are trying to whip the others into line. It is not natural for ropes to stand, even when they are propped. The regulation of freight rates in a large and complicated territory can be only partial or temporary at best. A partial regulation may stand for a considerable time—a wide-reaching regulation may stand for a short time; but thoroughness and permanency combined are unattainable. At least no traffic officer has future vision sufficiently clarified to dare to predict to the contrary. Pooling is not looked upon by the wisest heads as a sovereign remedy for present ills. Pooling should be authorized by specific Congressional statute, because there is not the remotest likelihood that under our present regulations any railroad pool will work against the public interest; but the main advantage such authorization would afford the railroads would be the chance to make their contracts on competitive business definite, expressed in dollars and cents, instead of more or less indefinite, as they would otherwise have to be. Pools would not obviate the necessity of frequently readjusting agreements, and, for reasons already suggested, every readjustment is likely to mean weeks or months of unstable rates.

The field being so large that no single man or committee can grasp, or even mentally survey, the whole of it, the only remedial theory—we will not call it a remedy—that contains any important element of hope is that under which every competitor is not only willing, but always ready, to refer every dispute to arbitration. This implies that he sees the wisdom of accepting eight per cent. peacefully rather than try for ten or twelve by fighting. All successful arbitrations—that of the Thurman committee in 1882, for instance—have depended upon this condition. The peace of the early months of the Joint Traffic Association was due to the working of the same principle. But why suggest arbitration? Under the Sherman law it is illegal.

Working Stresses for Railroad Bridges.

In another column we give an abstract of a paper on railroad bridge specifications, by Mr. H. B. Seaman, to be read Nov. 16, before the American Society of Civil Engineers. The paper discusses the important question of the proper method of selecting the unit-stresses to be used in bridge designing, and proposes a procedure differing somewhat from those in general use. A proposition of this kind, coming from a bridge engineer of wide experience, deserves careful consideration, and especially because it is presented from the point of view of the buyers and users of bridges rather than from that of the manufacturers.

As far as we can recall, the specifications issued by bridge manufacturers have not led to much discussion. Those published by railroad engineers have had a wider influence, while those issued by consulting and designing engineers, like Mr. Cooper and Mr. Waddell, have been especially instrumental in modifying and improving the methods of design. The specifications of Mr. Joseph M. Wilson, published in 1885, caused an extended discussion which was most useful in clearing away many hazy notions regarding impact and the influence of live load. The paper of Mr. Seaman and its accompanying specifications bring up these questions again, and it is well that he has done so, for the present practice among bridge designers is far from uniform.

It is not necessary to go very far back into ancient history to recall the time when the stresses figured for bridge members were maximum stresses only, and little attention was paid to the relative proportions of strain caused by dead and live loads. Thus if D is the dead load stress in a member and L the live load stress, the maximum stress when both D and L are tension or both compression is $D + L$. The section area of the member is then $(D + L) \div S$, if S is the allowable working unit stress. In the years before 1870 this allowable value was, for wrought-iron, generally taken as one-fifth of the ultimate strength, say 10,000 pounds per square inch in tension, and no attempt was made to vary it for different members. Gradually, however, the practice of varying S came into use, the highest values being employed for chords and the lowest for stringers and hangers, the idea being that the sudden application of a load really produced a higher stress than

the computed $D + L$, and that hence S should be made smaller. This practice has prevailed more or less until the present time; and the specifications of Mr. Seaman seem to be the first in which it is entirely abandoned.

Another method early used in this country was to add a certain percentage to the maximum stress $D + L$, this percentage depending mainly on the length of span and being the greatest for the shortest span. Thus, if n be a number between 1 and 2, the quantity $n(D + L)$ was regarded as an equivalent dead load stress, and this divided by the dead load S gave the section area. The values of n used in this method were perhaps 1.40 for spans of 25 feet, 1.20 for spans of 50 feet, 1.10 for spans of 100 feet, and 1.05 for spans of 200 feet. This practice was rounded on the idea that the shorter the span the greater is the influence of the live load, but it was at best a crude and imperfect utilization of the idea, for the percentages added varied arbitrarily with the fancy of the designer.

A better method of taking into account the impact influence of the live load was that of adding percentages to the live load stress only, for it should be clear that the sudden application of the live load cannot increase the computed dead stress D . Hence $D + nL$ is a better representation of the actual stress produced by the static computed stresses D and L , and $(D + nL) \div S$, where S is the allowable unit-stress due to dead load, is the section area of a member. This method is used by Mr. J. A. L. Waddell in his specifications for steel railroad bridges, his percentage additions being 40 for 500 feet spans, 57 for 200 feet spans, 67 for 100 feet spans, and increasing to 78 for 10 feet spans; thus the corresponding values of n are 1.40, 1.57, 1.67 and 1.78. Here, however, S is not kept really constant but has different values for different classes of members.

The experiments of Wöhler, completed in 1870, showed very clearly that rupture could be caused by many repeated stresses, none of which is as high as the ultimate strength of the material, and it accordingly followed that the working unit-stress S to be used as a divisor of the maximum stress $D + L$ should be lower for a large ratio of D to $D + L$ than for a small one. In 1873 Launhardt's formula was established; this gives a value of S depending upon this ratio of D to $D + L$, and also upon the ratio of the elastic limit of the material to its ultimate strength. Thus, for a steel whose elastic limit is one-half its ultimate strength, Launhardt's expression for S is $9,000(1 + R)$, where R denotes the fraction $D \div (D + L)$, and 9,000 is the unit-stress adopted for all live load; then if one-half the total load is dead the value of S will be 13,500, and if all is dead S will be 18,000 pounds per square inch. One of the first to use this method in America was Mr. C. C. Schneider, who in 1882 specified that the steel members of the Niagara cantilever bridge should be proportioned by the unit-stress $11,000(1 + \frac{1}{2}R)$. In 1885 Mr. Joseph M. Wilson adopted it for the bridge specifications of the Pennsylvania Railroad, and it has since been widely used. It must be noted, however, that most specifications use different factors or formulas for different members of the span, and also that compressive unit-stresses have been generally less than tensile ones.

One of the first to reject the arbitrary method of adding percentages for impact was Mr. Theodore Cooper, although he did not accept the conclusions of Launhardt. His method was to use for dead load a working unit-stress twice as great as for live load. Thus, if D and L be dead and live load stresses, both tension or both compression, and S is the allowable unit-stress for dead load, he found $D \div S$ as the section area for dead load stress, and $L \div \frac{1}{2}S$ as the section area for live load stress. Then the sum of these two areas is the total area of cross-section needed to resist the maximum static stress $D + L$. If this addition be performed algebraically it gives $(D + 2L) \div S$, and hence the method is equivalent to regarding the live load as applied with perfect suddenness so that the impact addition has its full theoretic value. This method Mr. Cooper used for the main truss members, retaining the old practice of dividing $D + L$ by an arbitrarily assigned S for lateral bracing, hangers, stringers and plate girders in general.

The method outlined by Mr. Seaman in his suggestive paper results from a discussion of Wöhler's experiments, with the purpose to deduce a simpler formula than that of Launhardt. He concludes that the effect of a live load indefinitely repeated is the same as that of a dead load of double the intensity. Thus, the dead load stress D and the live load stress L produce the same effect as the dead load stress $D + 2L$, and hence this divided by the allowable unit-stress S for dead load gives $(D + 2L) \div S$ as the

proper section area. This applies when both D and L are tension, and it is applicable also to compression if the length of the member is not sufficient to require it to be treated as a column. In computing the live stress L, Mr. Seaman specifies that the live load shall be increased by certain percentages whenever it produces the maximum stress in moving through less than 100 feet. Thus for 80 feet the increase is 1 per cent., for 40 feet 7 per cent., and for 10 feet 30 per cent.

The novel thing in these specifications is that the working unit stress S for dead load is always kept at the same value, 18,000 pounds per square inch for rolled steel, whether the piece under consideration be chord, diagonal, lateral, floor beam or stringer. This is not only new but bold, and doubtless some will rise to oppose it, yet if the elastic limit of steel is the same in tension and compression, and if all the live load stresses have been reduced to an equivalent dead load stress then it certainly is a logical method, and its simplicity renders it a very convenient one.

It will be seen that the rules of Mr. Cooper and Mr. Seaman for finding the section area of a main truss member are identical, each leading to the result $(D + 2L) \div S$. The former varies S for different cases, while the latter keeps it invariable and applies the method to all details. Mr. Cooper makes no percentage allowance for impact, while Mr. Seaman does so for stresses produced by a motion of less than 100 feet. It is indeed remarkable that practically the same conclusion should have been deduced from very divergent views, one opposing the theory of fatigue of materials, while the other accepts it as fully confirmed. One view appears to be based on the well-known increase in strain caused by a sudden application, and maintains that no amount of fatigue can injure metal unless the elastic limit is surpassed; another view pays no attention to the suddenness of the applied stress, but derives its conclusions from experiments where repeated stresses have exceeded the elastic limit. Both views lead to the result that the effect of live load on bridge structures is to produce stresses about double of those caused by a dead load of the same intensity.

Those who accept the conclusions of Launhardt's investigation may perhaps feel disposed to rise and remark that the rule of Cooper and Seaman gives a higher degree of security than is necessary. For example, taking a structural steel whose elastic limit is one-half of the ultimate tensile strength, and using 18,000 pounds per square inch for dead load, Launhardt's formula gives 13,500 pounds when one-half of the load is live, and 9,000 when all the load is live, while the corresponding figures by the other rule are 12,000 and 9,000 pounds per square inch. These are the variable values of S to be divided into D + L, not into D + 2L, in order to determine the cross-section.

There are two other methods of assigning unit-stresses which may be noted here, although they do not appear to have been used in bridge specifications. Both are based on Wöhler's experiments and follow the Launhardt method of dividing the maximum stress D + L by a variable unit-stress S. The method of Prof. Merriman, given in his *Mechanics of Materials*, would make the value of S for the above case to be $9,000 (1 + \frac{1}{2}R + \frac{1}{4}R^2)$ where R is the ratio of minimum to maximum stress. The method of Prof. Johnson, given in his *Materials of Construction*, makes the value of S to be $9,000 \div (1 - \frac{1}{2}R)$. When one-half of the total load is dead the first of these formulas gives S as 12,750, while the second gives S as 12,000. It is seen that the formula of Prof. Johnson leads to identically the same results as the rule of Cooper and Seaman, while the results from Prof. Merriman's formula fall between these and Launhardt's values.

Mr. Seaman's method of procedure when one of the limiting stresses is tension and the other compression is to increase the compressive stress by the use of the column formula, add this to the tensile stress and divide by 9,000 instead of 18,000. This appears to give somewhat larger sections than most of the methods heretofore proposed. For a short piece, where the column action need not be considered and where the dead tension D is numerically equal to the live compression L, his rule gives an area of D ÷ 4,500, while by taking R as negative unity in the formulas of Profs. Merriman and Johnson, it is seen that they agree in giving the considerably smaller area of D ÷ 6,000.

Space forbids a discussion here of the very rational manner in which these specifications use Rankine's column formula in cases of alternating tension and compression. The formula for rollers, in which the allowable pressure varies with the

square root of the diameter, will perhaps be criticised by some as both irrational and somewhat out of date. The rolled steel that is specified may be objected to by others as too soft and the rivet steel as too hard. All, however, will concede that these specifications should produce a bridge of a high degree of security. If it be maintained that this is higher than appears necessary under the old rule of Launhardt, it should not be forgotten that this was deduced from laboratory experiments which did not include the effect of loose joints, flat car wheels or unbalanced locomotive drivers. The empirical allowances still deemed necessary for short spans and floor stringers show that these influences are important ones which must in some way be provided for in the specifications. The effort of Mr. Seaman to do this in a uniform manner will certainly be highly appreciated by all bridge engineers and will tend to advance and perfect the rational design of railroad structures.

September Accidents.

Our record of train accidents in September, given in this number, includes 99 collisions, 82 derailments and 4 other accidents, a total of 185 accidents, in which 50 persons were killed and 128 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

COLLISIONS.	Rear.	But-ting.	Cross-ing and other.	Total.
Trains breaking in two.....	15	0	0	15
Misplaced switch.....	2	0	0	2
Failure to give or observe signal.....	6	2	5	13
Mistake in giving or understanding orders.....	0	5	0	5
Miscellaneous.....	7	4	11	22
Unexplained.....	14	17	9	40
Total.....	44	30	25	99

DERAILMENTS.

Broken rail.....	1	Misplaced switch.....	4
Loose or spread rail.....	2	Careless running.....	2
Defective switch.....	2	Track repairs.....	1
Defective frog.....	1	Bridge repairs.....	1
Broken wheel.....	5	Animals on track.....	6
Broken axle.....	2	Landslide.....	1
Broken truck.....	2	Washout.....	2
Fallen brakebeam.....	1	Malicious obstruction.....	2
Failure of drawbar.....	2	Unexplained.....	37
Broken car.....	2		
Boiler explosion.....	1		82

OTHER ACCIDENTS.

Boiler explosion.....	1
Broken side rod.....	1
Other causes.....	2
Total.....	4

Total number of accidents..... 185

A general classification shows:

	Colli-sions.	Derail-ments.	Other acci-d's.	Total.	P. c.
Defects of road.....	0	6	0	6	3
Defects of equipment.....	15	20	2	37	20
Negligence in operating.....	44	8	1	53	29
Unforeseen obstructions.....	0	11	1	12	6
Unexplained.....	40	37	0	77	42
Total.....	99	82	4	185	100

The number of trains involved is as follows:

	Colli-sions.	Derail-ments.	Other acci-d's.	Total.
Passenger.....	25	19	3	47
Freight and other.....	151	66	1	218
Total.....	176	85	4	265

The casualties may be divided as follows:

	Colli-sions.	Derail-ments.	Other acci-d's.	Total.
Killed:				
Employees.....	11	21	1	33
Passengers.....	2	4	0	6
Others.....	8	3	0	11
Total.....	21	28	1	50
Injured:				
Employees.....	44	33	1	78
Passengers.....	15	28	0	43
Others.....	6	1	0	7
Total.....	65	62	1	128

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. Killed.	Pass. Injured.	Emp. Killed.	Emp. Injured.
Defects of road.....	0	0	0	0
Defects of equipment.....	0	1	3	6
Negligence in operating.....	2	18	14	49
Unforeseen obstructions and maliciousness.....	1	15	12	9
Unexplained.....	3	12	4	14
Total.....	6	43	33	78

Thirty-five accidents caused the death of one or more persons each, and 33 caused injury but not death, leaving 117 (63 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with September of the previous five years shows:

	1898.	1897.	1896.	1895.	1894.	1893.
Collisions.....	99	77	64	50	47	77
Derailments.....	82	70	64	54	91	75
Other accidents.....	4	0	7	4	8	6
Total accidents.....	185	147	116	108	146	158
Employees killed.....	33	39	30	25	30	32
Others killed.....	17	33	24	13	20	47
Employees injured.....	78	68	70	53	84	101
Others injured.....	50	97	109	126	42	99
Passenger trains involved.....	45	53	33	42	61	59

Average per day:

	1898.	1897.	1896.	1895.	1894.	1893.
Accidents.....	6.17	4.90	3.87	3.60	4.87	5.26
Killed.....	1.67	2.40	2.13	1.27	1.67	2.63
Injured.....	4.27	5.50	5.97	5.97	4.20	6.67

Average per accident:

	1898.	1897.	1896.	1895.	1894.	1893.
Killed.....	0.27	0.49	0.47	0.35	0.34	0.50
Injured.....	0.69	1.12	1.54	1.65	0.86	1.26

Of the six passengers killed or fatally injured in September, one was riding in the caboose of a freight train and one was on a special train carrying a circus. The passenger train accidents fatal to passengers were those at Whittenton Junction, Mass., on the 6th; Sulphur, Tex., on the 12th, and Corsicana, Tex., on the 26th. The Massachusetts Commissioners' report on the Whittenton collision is published in another column.

Another bad passenger train accident was that at Fulton, N. Y., on the 1st, at which 10 passengers were injured. There seems to be no doubt that the switch at which this train was derailed was maliciously misplaced.

In a collision of passenger trains near Stellarton, N. S., on the 28th, five persons were killed, including one passenger.

There were 10 electric car accidents in September; four collisions, four derailments and two cases in which locomotives struck street cars. One of these, that at Cohoes, N. Y., on the 5th, was reported in the *Railroad Gazette* of Sept. 9, p. 651. At Cohoes, 15 passengers were killed and about 20 injured. The total reported in all the 10 accidents is 15 persons killed and 44 injured.

The methods of the rate-cutters are legion. Not many traffic managers tell how they work their schemes—at least no one tells, until a good while afterward, how he himself evades the law—but now and then some one lets us know how the other fellows do it. Mr. Depew of the New York Central has lately given the reporters the following:

"In many instances railroad companies cannot get cars enough to carry the freight that is offered. And yet some of these overcrowded roads are cutting rates and making contracts ahead at figures below the tariff. For instance, one railroad will make a low contract for thirty or even ninety days from date. In this way that road threatens to take away business which the managers of other roads think they will need when the time comes. The other roads consequently look about them and endeavor to fortify themselves for the future by making similar cut-rate contracts. This fight for future business naturally affects present conditions, and causes a demoralized scramble for all the freight business in sight."

One of the advantages of making your cuts effective at some time in the future, is that you can promise yourself that you will, before they go into effect, publish the reduced rates, and thus make them lawful. Then, of course, if you conclude that it is best not to publish them, after all, why—that is another story.

Since the formation of the great state railroad systems on the continent of Europe, it is noticed that the employees are less and less inclined to look to their official superiors for increases in their pay and other improvements in their condition, and more and more appeal directly to the various legislative bodies which make the appropriations for wages, etc. And it has more than once happened that they have secured from the legislatures what the railroad managements had refused to approve, or more than they were willing to ask for. The branch of the government in charge of the railroads makes its reputation largely by economy, and must ask appropriations of the legislature after consultation and agreement with other branches of the government, which are all likely to desire more than they can get, and so prove a check on each other in making up their estimates. But the representatives who vote the supplies are apt to have a very tender regard for a great army of employees who cast many votes—very much as if they were members of state legislatures or of Congress in this country. Complaints are now heard in Europe that this is ruinous to discipline. The men who find that they can advance in their careers without the approval of their superior officers lack one of the principal ordinary motives for strict attention to duty.

NEW PUBLICATIONS.

Up to Date Air Brake Catechism. By Robert H. Blackall, Air Brake Inspector and Instructor on the Delaware & Hudson Railroad. Twelve mo. 230 pages, with index and many illustrations. New York; Norman W. Henley & Co., 1898. Price \$1.50.

A catechism as a means of conveying knowledge and opinion may be successful or it may not, according to the man who makes it. Those of us who grew up in New England have a profound and lasting prejudice against the catechism, but the more fortunate later generations who were gently introduced to the catechism by Mr. Forney look upon it as one of the most delightful forms of literature. Mr. Forney did not, however, originate the idea of the catechism as a vehicle for scientific and technical information. His first notion was to translate a German catechism of the locomotive, but as the reader who is even slightly familiar with the German language can well understand, it was soon found that a German catechism of the locomotive would be about as likely to interest the American locomotive engineer as would the book of Deuteronomy. Therefore, Mr. Forney took from the German nothing but the word "catechism" and the notion of casting his treatise in the form of questions and answers. This book became so popular that the catechism form has been much used by later technical writers.

The latest technical catechism that we have seen is Mr. Blackall's Catechism of the Air Brake, and this belongs in the small list of really valuable catechisms. The title page tells us that "it is a complete study of the air brake equipment, including the latest devices and inventions used. All troubles and peculiarities of the air brake and a practical way to find a remedy for them are explained. It contains nearly 1,000 questions with their answers, intended as examination questions for engineers and firemen, as well as all other practical railroad men." The author begins with a brief story of the origin of the air brake, and then proceeds to describe the plain triple valve and its functions. This naturally leads up to the Westinghouse quick action triple, the parts of which are described and shown by adequate engravings. Next, there is a chapter on the peculiarities and troubles of the triple, then a very short special chapter on Westinghouse freight equipment. The topics then taken up are piston travel, the retaining valve, the main reservoir, the engineer's valve, the feed valve or train line governor, the little drum, the peculiarities and troubles of the engineer's valves, pumps and governors, the air signal equipment, the Westinghouse high-speed brake, and, finally, train handling, inspection, tests and piping and braking power and leverage. It will be seen that the project of the book covers the subject very completely. From a somewhat careful examination we can say that the subject is well covered, and we have detected no errors of fact or opinion.

Elements of Sanitary Engineering. By Mansfield Merriman, Professor of Civil Engineering in Lehigh University. Octavo, 216 pp.; illustrations. New York: John Wiley & Sons, 1898. Price \$2.

Prof. Merriman's latest book is divided into five chapters, Sanitary Science, Water and its Purification, Water Supply Systems, Sewerage Systems, Disposal of Garbage and Sewage. The first chapter treats briefly but systematically and clearly of diseases and vital statistics, of those causes of diseases with which the sanitary engineer may deal, and finally of the broad general result of sanitary science in adding to the term of life of the people of the United States. From 1850 to 1890 there was a gain of 3.1 years in the median age, the median age being such that one-half the population is less than it and the other half is greater than it.

The other chapter headings explain themselves. Of course, in one small volume covering a field so vast no one of these many topics can be treated exhaustively, but all that the author has tried to do he has done soundly and from the standpoint of comprehensive knowledge. Obviously his purpose has been to put the engineering student and the younger municipal engineer in possession of accurate elementary knowledge of the broad principles and general practice of that branch of engineering which the author says "is the most interesting and important." Thanks to his own solid grasp of the subject, and to his direct and sincere purpose, and to his command of a beautifully simple English style, he has succeeded.

TRADE CATALOGUES.

Hoisting Engines, etc.—The Lidgerwood Mfg. Co., 96 Liberty street, New York, sends us a new catalogue of hoisting engines, boilers, suspension cableways, log hauling machinery, hoisting and conveying apparatus, Temperly transporters, etc. It is a fine quarto pamphlet 9½ x 12 in., well illustrated, and showing, of course, an immense variety of contractors' machinery and hoisting and conveying machinery of various sorts. In a special notice we are informed that the shop organization has been much improved in the past year, and that all the work is done now, as heretofore, on the duplicate part system, insuring absolute accuracy and perfect interchangeability. A full line of finished parts is kept in stock.

Catechism of the M. C. B. Rules. Issued by the McConway & Torley Company, Pittsburgh, Pa., 1898.

And we have still another catechism. This one, however, does not pretend to have been issued for the sole purpose of conveying information. The candor of the company informs us on the title page that it is intended to be of use to car inspectors and also to call their attention to the merits of the Janney coupler. The last question in the Catechism, being Q. 100, is as follows: "Is this Catechism an advertisement?" The answer is pretty long, but the essential part of it is: "Frankly, it is." The other ninety-nine questions, however, actually apply to the M. C. B. Rules of Interchange. In the preface we are told that the McConway & Torley Company thinks "that the M. C. B. Rules, while very clear, may be rendered easier to understand and remember by putting them into this form." This is undoubtedly true. The little catechism is a careful analysis of the rules. The essentials are brought out point by point and explained, and we judge that the catechism will be really useful. It can be had post free by addressing the publishers.

Attachment for Pneumatic Drills.

The Chicago Pneumatic Tool Co. is putting on the market an attachment for use with the Boyer and Whitelaw pneumatic drills to enable holes to be bored or drilled close to corners. The attachment consists of a case in which is mounted a pair of bevel gears which transmit motion from the main spindle of the drill to a second spindle at right angles to it. The socket for the drill is mounted on the second spindle, which is also provided with a screw feed at the opposite end. As shown by the engraving, a convenient support for the tool when used for car repairs consists of a rod on which is mounted a pair of clamps and an arm against which the screw feed acts.

Regulated Pooling.

(Continued from page 795.)

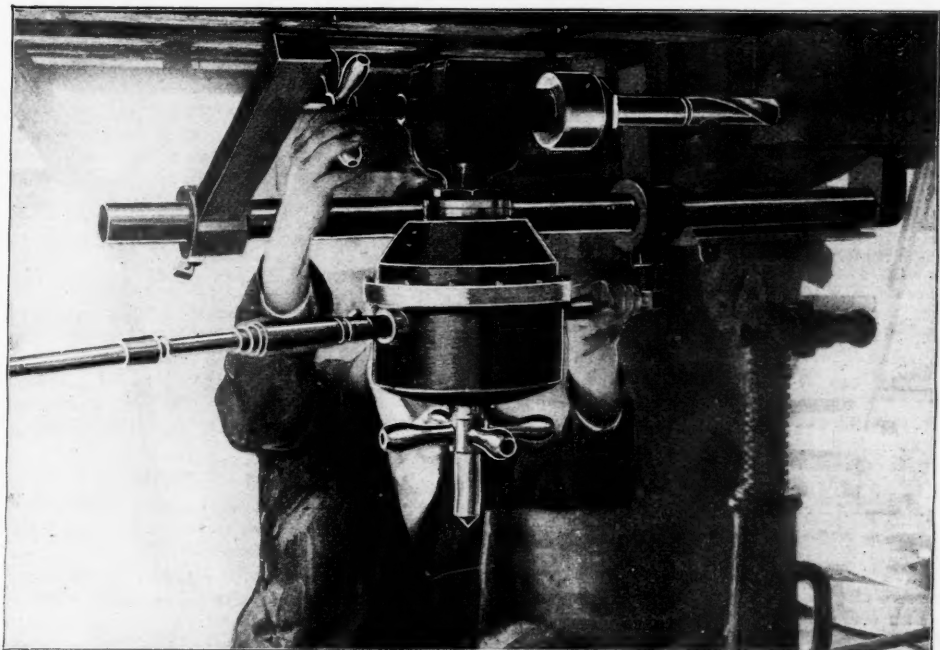
Pooling will be authorized, therefore, whenever the railroads are, with practical unanimity, willing to accept it upon the terms with which it is offered. This fact makes it important to examine those terms and the probable consequences of their acceptance.

The extreme statement of the conditions which it is proposed to exact as consideration for permission to pool traffic may be found in Senate bill No. 3354 of the second session of the Fifty-fifth Congress, now pending, commonly known as the "Cullom Bill." No one supposes that the friends of the effective public regulation of railroads will insist upon everything contained in this measure, or that the Interstate Commerce Commission itself, as now constituted, will refuse its sanction to any reasonable conces-

changes can be enforced, rate wars, with the serious losses which they unavoidably entail, will be eliminated. Such a requirement will also give stability to industry and tend to foster the development of traffic. This provision may be declared, therefore, to be in the interests of the carriers, though it would be disingenuous to omit that it seems more certain than any of the other requirements to be left out of whatever legislation may finally be adopted.

From the standpoint of railroad corporations, the arguments in favor of the remaining provisions may be stated together. It will not be necessary to rely upon the interest of the carriers in the symmetrical development of the industries of the country, which is obviously interrupted by unjust discriminations, and the consequent importance to them of the successful regulation of rates so as to eliminate such discriminations. However clearly the foregoing might be established, there are more immediate reasons why the railroads should favor the proposed legislation which are quite sufficient and are more easily defined.

It is conceded that the powers which it is proposed to delegate to the Interstate Commerce Commission are of considerable magnitude, and in addition to any which that body has ever legally exercised, but, on the other hand, they do not, and, in the nature of things cannot, exceed those continuously at the disposal of Congress. The change intended is merely a concentration and definition of regulative functions and authority in order to secure a more satisfactory adaptation of means to the ends desired. Endowed with the powers suggested, the Interstate Commerce Commission would constitute, in effect, a court of interstate transportation, its proceedings subject to



Attachment for Pneumatic Drills.

sion that public interests will permit. It has seemed proper to formulate an ideal measure, but it is not demanded that the result shall be exempt from those concessions and compromises which almost invariably characterize important legislation. Yet if the bill in question were to be adopted as it stands, in connection with a pooling amendment in the form embodied in the Patterson and Foraker bills, would it injuriously affect railroad interests?

Excepting certain changes in phraseology intended to give greater completeness and definiteness to the terms of the statute, the principal substantial modifications contained in the proposed amendment authorize the Commission to prohibit a greater charge for an intermediate short haul than for a longer haul in the same direction, require sixty days' notice of change in rates or conditions of service, unless shorter notice is for cause permitted by the Commission, give the Commission power to prescribe what shall be considered reasonable rates after due and impartial investigation, give substantial finality to the conclusions of fact reached by the Commission, and render its orders enforceable by judicial process without the expense and delay incident to proceedings for that purpose at the present time.

The proposed fourth section appears to be mere surplusage, inserted in deference to the sentimental rather than the thoughtful advocates of regulation. The Commission would not prohibit any greater charge for a short haul unless it was considered unreasonable, and in the latter case it could as effectively remedy it under the terms of the sixth section of the proposed law as under those of the fourth.

Railroads should profit considerably through anything which would restrict opportunity to make hasty and thoughtless changes in charges. The history of rates shows that the greater number of changes are reductions, and demonstrates the frequent impracticability of restoring rates once reduced. If a requirement of sixty days' notice of

review by the higher Federal courts. Its especial knowledge of the business of transportation would enable it to deal with the semi-technical questions of rate-making as a board of experts; while the confidence of the public in its integrity and experience would invoke public sentiment in support of its decisions when they should be favorable to the railroads. It is important to the railroads not only that they should deal fairly and equitably with their patrons, but that the public should have evidence of the reasonableness of their demands and confidence in the integrity of their intentions. How can these results be secured more effectively and permanently than by unmistakable manifestations of willingness on the part of the railroads to submit their acts to the review of an impartial board of experts in transportation under an agreement to abide by its conclusions? If the railroads accept the conditions now offered, such will be the situation, and the board will be one of permanent and general arbitration and conciliation.

What are the objections? "We would be willing," say some railroad officials, "to submit our rates to the present Interstate Commerce Commission, but we would not agree to submit them to any commission that might be appointed, say, by a populist president." But if the United States ever has a populist president, the same voters who elect him will also select representatives in Congress. With a populist government, what would constitute a greater provocation to drastic action than the present acknowledged failure of the congressional attempt to regulate interstate transportation? That failure would not only justify radical anti-railroad legislation, but it is at present, and until corrected will continue to be, a powerful adjunct to every populist campaign.

Railroad officials do not claim that their present rate-making powers are not subject to quite as stringent limitations as the most drastic legislation

could impose, though present restrictions are generally commercial rather than statutory. Surely, to add that rates shall be subject to the review of a competent board, which can alter them only after most thorough investigation and argument, will not prove a material restriction.

Nor will the most experienced claim that the rate-making officials of each particular road are always the persons best able to decide what charges are reasonable for the services of such roads. Many railroad men would gladly have invoked the aid of a competent tribunal, during the past year, to secure the maintenance of rates voluntarily reduced by other carriers.

The obvious conclusion from this examination of the situation is that, however radical the proposed legislation may appear, and however extensive may be the departure from established precedents, its prompt enactment will safeguard the railroads against legislative attacks which are threatened in case the present universally unsatisfactory condition continues; that it will to a great extent exempt them from rate wars and the losses of revenue incident thereto, and produce more satisfactory relations among the quasi-independent corporate units that compose the railroad system. When it is considered that it will also confer the inestimable privilege of pooling traffic, there appears to be no ground for reasonable opposition.

H. T. NEWCOMB.

Washington, D. C., Oct. 20.

Spliced Air Brake Hose.

At the September meeting of the Western Railway Club a motion was passed making it the sense of the meeting that it was safe, economical and good practice to splice and use second-hand air brake hose in freight service, and that such spliced hose should be accepted in interchange without a card. Mr. A. M. Waitt opened the discussion which preceded this motion, and stated that the Lake Shore & Michigan Southern had been following this practice successfully for about two years on its own cars, and that the total cost of splicing a hose was about 7 cents. He stated that it was not safe to splice hose which had been in service over two years, unless it had been purchased under a special specification.

Mr. A. E. Manchester stated that the Chicago, Milwaukee & St. Paul on June 30 last had 40,293 hose in service. The total number of failures from all causes during the year was 6,323, and of this number 2,766 were spliced and returned to service. The total number of hose which failed was about 15 per cent. of the total number in service, and the number of failures of spliced hose was about 14 per cent. of the total number of spliced hose in service. Mr. G. W. Rhodes said that the Chicago, Burlington & Quincy was using at Aurora about 500 spliced hose per month, costing 7 cents each, or a total of \$35. If new hose had been used, costing 75 cents each, the total cost would have been \$375; a saving of about \$340 was thus accomplished. These figures may be suggestive to those railroads which have commenced to splice air brake hose.

TECHNICAL.

Manufacturing and Business.

The New Jersey & Pennsylvania Concentrating Works, located at Edison, N. J., want a gear cutter to cut up to 65 in. in diameter. In writing, state price, give full details and send photograph or cut.

The Russell Snow-Plow Co., Boston, Mass., has recently received orders for Russell snow-plows as follows: From the New York Central & Hudson River, two for the western division of the main line and two for the Rome, Watertown & Ogdensburg. From the Saginaw, Tuscola & Huron, one with air flanger; from the Washington County, three with hand flanger.

According to the Journal of Commerce, the Governor of the state of Vera Cruz, Mexico, has established at Xalapa a special bureau of information with the object of furnishing, without charge, information from official sources respecting the state of Vera Cruz. Inquiries may be addressed to Alexander M. Gan, Special Agent, Xalapa, state of Vera Cruz, Mexico.

Safety hollow staybolts made by the Falls Hollow Staybolt Co. of Cuyahoga Falls, O., are specified for the 35 locomotives ordered by the Atchison, Topeka & Santa Fe.

The Sterling Emery Wheel Co., Tiffin, O., has recently made changes in its factory, increasing the capacity about 75 per cent. A new kiln has been put in and all the old ones have been rebuilt. Improved blowing apparatus has been installed.

H. A. Fitz, formerly Mechanical Engineer of the Universal Car Bearing Co., severed his connection with that company Nov. 1.

The National Machinery Co., Tiffin, O., is very busy and its factory has been running 14 hours a day for some time. Among recent orders received by this company are 16 bolt and nut machines and some automatic and upsetting machines for Germany and five nut machines for Sweden. It has just

finished 40 wire nail machines for the Kelly Iron Works at Irondale, O.

The Johnson hopper car bottom, made by McCord & Co., Chicago, is being applied to 300 coal cars now being built for the Delaware & Hudson Canal Co. by the Buffalo Car Mfg. Co.

Gould & Eberhardt report that they have been very busy for some time, and that they have a number of Government orders for patent extension base shapers and automatic gear cutting machines. They are now shipping eight improved drills to the Government at Rock Island, Ill., as well as some for New York.

Specifications are being sent out by W. H. H. Benyard, Lieutenant-Colonel Engineers, U. S. Engineers' office, St. Augustine, Fla., for work on Mullet Key and Egmont Key, Fla. Bids will be received up to 12 o'clock noon, Nov. 21, for the work, which includes cranes, hoists, ammunition trolley systems, anchor bolts and steel beams and other building material.

The plant of the Niles Tool Works will be enlarged by the addition of a new shop, 70 ft. x 200 ft.

Bids are being asked in England by the Agent-General for Victoria, 15 Victoria street, London, for supplying 32,180 tons of rails and 3,258 tons of fish plates. Bids close Dec. 19.

The American Steel Casting Co. has declared a dividend of 3 per cent., payable Nov. 7.

A dividend of 11.66% per cent. has been declared on the preferred stock of the General Electric Co., payable Nov. 15.

A semi-annual dividend of 3 per cent. has been declared by the Railway Equipment Co. of Minnesota, payable Nov. 1.

The Sprague Electric Co. has declared a dividend of 3 per cent. on its preferred stock, payable Nov. 1.

Henry R. Worthington has declared a dividend of 3½ per cent. on preferred stock, payable Nov. 1.

Last week we illustrated one of the two consolidation engines recently built by the Pittsburgh Locomotive & Car Works for the Union Railroad Co., and which are supposed to be the largest ever built. This engine is equipped with slide valves made by the American Balance Slide Valve Co. of Jersey Shore, Pa.

The Times-Gazette of Redwood City, Cal., of Oct. 22, states that the Council of that city has discussed specifications for a new incandescent light plant, but has taken no action.

R. D. Chanler of San Francisco, Cal., has placed a contract with the San Francisco Bridge Co. for building coal bunkers on Pier 15, the amount being \$23,687.50.

Iron and Steel.

At a meeting of the stockholders of the Cambria Iron Co., held Oct. 26, it was decided to lease the company to the Cambria Steel Co.

It is stated that the Government of Chile has appropriated \$500,000 to foster iron and steel enterprises.

It is reported that the Schoen Pressed Steel Co. contemplates further additions to its plant.

Plans have been drawn and it is stated that bids are now being asked for building a plant for the Alcania Tin & Terne Plate Co., at Avonmore, Pa. There will be a main building 100 x 200 ft., pickling house 50 x 50 ft., tinning house 50 x 130 ft., boiler house 50 x 60 ft., and several smaller buildings. A 16-ton traveling crane will be installed.

According to report the Ohio Steel Co. of Youngstown, O., is now ready to receive proposals for the machinery necessary to make rails.

An English trade paper states that a wire rope factory is to be built shortly in Tokio, Japan, under English management.

The importation of American pig-iron into Belgium for the first eight months of 1898 amounted to 3,630 tons, as against 11,205 tons in the first eight months of 1897.

The exports of iron ore from Sweden during the first eight months of 1898 reached a total of 903,148 tons, as compared with 983,567 tons for the corresponding period of 1897.

Returns show the total output of finished iron in France for the first half of 1898 to be 407,930 tons, an increase of 2,234 tons over the first half of 1897.

Figures in English trade papers show that the United Kingdom imported from the United States in July, 1898, 3,443 tons of pig iron and 2,842 tons of steel, as against 3,251 tons of pig iron and 1,186 tons of steel in July, 1897; in August, 1898, 1,199 tons of pig iron and 3,396 tons of steel, as compared with 5,220 tons of pig iron and 326 tons of steel in the same month in 1897; in September, 1898, 3,402 tons of pig iron and 2,443 tons of steel, as against 2,199 tons pig iron and 665 tons of steel in September, 1897. The average value of the imported pig iron was in July 46s. a ton, in August 55s. a ton, and in September 67s. a ton. The average value of the steel imported in July was £4 16s. 9d. a ton, in August £5 14s. 5d. a ton, and in September, £5 19s. a ton.

Bids will be asked within sixty days by the Ban-

gor, Hampden & Winterport, for 950 tons of 60-lb. rails. J. H. Green, Bangor, Me., is Superintendent and Purchasing Agent. (See Railroad Construction column.)

New Stations and Shops.

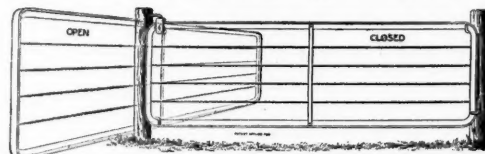
Regarding the rumor to the effect that the Pennsylvania Company has bought a tract of land near Youngstown, O., on which to build new shops, we are advised by an officer of the company that land adjoining the Mosier yard has been bought to enlarge the facilities for storing ore, limestone, etc., used by the furnaces in the Youngstown district.

It is said that the Riter-Conley Mfg. Co. of Pittsburgh has a contract from the Mexican City Tramway Co. for several buildings, among which are a main building, a coal storage building and an engine and boiler house.

On Oct. 25 the Georgia Railroad Commission allowed the roads running into Atlanta 30 days more to agree upon a plan for a new union station.

A Metal Gate.

The McMullen Fence Co., Chicago, is putting on the market the metal gate shown by the accompanying engraving, which operates without hinges. In opening the gate it is lifted from hooks on a post at one end and pushed back, being supported by a roller



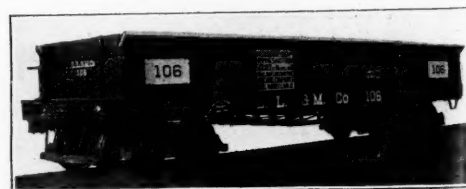
on the opposite post. The gate frame is made of a rolled steel section with which either barbed wire or plain cables are used as desired, the standard size being 4 ft. by 14 ft. The advantages claimed are that the new gate is lighter and more durable than a wooden construction and is not liable to destruction by fire.

The Ship Canal at the Iron Gates.

The ship canal at the Iron Gates of the Danube in Hungary, where the rapids have been the great obstacle to the navigation of the lower course of that great river, was opened for navigation Oct. 1. The rapids were scarcely passable at all when the river was low, and it has been very low recently; so that when the canal was opened some 90 vessels of the Danube Steamship Co., loaded with grain and chiefly with Indian corn, were waiting below the rapids for the water to rise. The canal is open for vessels passing up from 5 to 12 a. m., and for those going down from 2 p. m. till dark. The first vessel was towed up through the canal in 42 minutes. For the present vessels pay no toll, but it is provided that certain charges may be made later. The canal serves not only for shipments from Roumania and Bulgaria, but also from South Russia, to Austria and South Germany. If it had been opened 20 years or more ago, before railroad transportation became so cheap, it probably would have developed an enormous traffic, and as it is it may prove a very important route for traffic in both directions; but the authorities have decided that the traffic which is to use it cannot bear tolls high enough to pay interest on its cost, which has been about \$9,000,000. This is very good evidence that it will not very greatly cheapen the cost of transportation.

Reinforced Coal Cars.

The engraving from a photograph shows a patent side attachment for a coal car which is made by the Lima Locomotive and Machine Company. The photograph is of a car of 50,000 lbs. capacity. The side



attachment adds considerably to the strength of the car and prevents coal falling off, and is considered by the makers as a very decided improvement.

The New London Coaling Station.

The New London coaling station for the U. S. Navy will be built after the plans prepared by the Brown Hoisting & Conveying Machine Co. The contracts have been awarded by the Bureau of Yards and Docks to J. W. Hoffman & Co., of Philadelphia, who bid exclusively on the Brown Hoisting & Conveying Machine Co.'s plans, which were accepted from among twelve bidders, Hoffman's bid being \$56,000 higher than the lowest bid. The Brown Hoisting & Conveying Machine Co. will furnish and erect two extra heavy bridge tramways, the same as those now being supplied by the same company to the Navy at Key West and Dry Tortugas. These bridges are of 180 ft. span, with 92 ft. cantilever extensions, and 36 ft. projection over the front of the dock. Messrs. J.

W. Hoffman & Co. will build the necessary piers and buildings to accommodate this machinery.

Sale of the Rhode Island Locomotive Works.

According to newspaper dispatches, Mr. Joseph Leiter, of Chicago, has bought the plant of the Rhode Island Locomotive Works at Providence in the interests of certain Western capitalists, who in turn are identified with the Wheelock Engine Co., of Worcester, Mass., and that the plant will be devoted to making Wheelock stationary engines. As near as we can learn, this is probably true, and, furthermore, that a part of the works will be arranged for building street cars, switching engines and other equipment for one of the companies now controlling patents for the application of compressed air to traction.

THE SCRAP HEAP.

Notes.

The number of clerks in the railway mail service killed during the last fiscal year, as reported by the General Superintendent, was seven, and the number seriously injured was 34.

The Colorado Springs Gazette says that a section foreman of the Atchison, Topeka & Santa Fe lately rode on his railway bicycle from Denver to Colorado Springs, 75 miles, in two hours 48 minutes, which is equal to 26.8 miles an hour. No great exertion was required, and the rider came into Colorado Springs "as fresh as a daisy." The machine used weighs 62 lbs. It is like an ordinary bicycle with the third wheel on the second rail.

On the night of Oct. 24 passenger train No. 12 of the Erie road ran from Great Bend, Pa., to Susquehanna, 10 miles, at full speed, without an engineer. The fireman, Henry Kinsley, was killed by striking his head against a bridge about one mile west of Great Bend. The fireman, being in a separate cab, several feet back of the engineer's cab, did not know of the accident and did not discover that the engineer was dead until he noticed that steam was not shut off on approaching Susquehanna. The fireman stopped the train in safety.

Half Fare Under Twelve.

On one of the Bavarian lakes there is a steamer which formerly carried children under 5 free and those under 12 at half price. American railroad conductors will be astonished to learn that 5 and 12-year-old children traveling on this steamer very often were found to be astonishingly large for their ages. Suspecting some error and unwilling to call in question the accuracy of the memories of the mothers who bore these children, and who answered the question "How old is this child?" the steamer authorities gave up any attempt to discriminate in fares according to ages, but with a malignity worthy of an American soulless corporation substituted a discrimination according to size! Children under 24 in. high travel free, and those between 24 in. and 4 ft. 3 in. pay half price, and the ticket collector goes around with a 5 ft. rule! This is said also to be the practice in India, where, for Europeans at least, it is exceedingly difficult to judge of the ages of children by their appearance, and the native parents do not know how to speak the truth.

Chicago Garbage Contracts.

In the case of the proposed five-year garbage contracts for Chicago, which have been mentioned in this column from time to time, the Supreme Court of Illinois, on Oct. 24, sustained the opinion of the lower court and decided that the contracts were illegal. This decision is an important one for Illinois, as, in addition to preventing the carrying out of the contracts in question, it limits the power of municipalities in making other contracts. In the case under consideration a contract had been made for the daily collection and removal of all refuse, which was to be disposed of at crematories built by the contractor, the cost of the service to be less than the present inadequate plan. The point made against the contract was that it had been made for five years when the appropriation was made for only one year and could not be made for a longer time, the argument being that the city could only create a contract indebtedness, outside of its bonds, for such time as money could be appropriated to meet it.

A Lake Storm at Chicago.

Much damage was caused at Chicago and on Lake Michigan by the storm of Oct. 25. The sea wall on the north shore was seriously injured, the wall in some places being washed away. On the South Side the new roundhouse of the Illinois Central and the seven miles of its track along the shore were damaged to the extent of several thousand dollars. For 48 hours 19 employees of the Fitz-Simmons & Connell Co., contractors for the lake section of the new Northwest land tunnel, were imprisoned in the crib of the tunnel three miles from shore.

The G. P. A. of the Last Century.

In his address before the General Passenger and Ticket Agents, at Detroit, October 19, Mr. D. M. Martin, of the Baltimore & Ohio, related an instance showing that the arts of the passenger agent flourished in this country long before railroads were thought of. He said:

"When the Philadelphia & Baltimore Eastern Shore Line post coaches in 1788 were advertised to run twice a week, from Philadelphia to Baltimore, on a schedule tariff of one pound and five shillings from Philadelphia to the Susquehanna River, and from that point to Baltimore, a further distance of thirty-seven miles, without additional charge, we note the incipient genius of the modern passenger agent; for the gratis carriage from the river to Baltimore was to meet water competition. The combination of water and land transportation through which the packet boat and the stage coach, although of separate ownership and distinct lines, became concentrated into one continuous route, was an enterprise originating through the activity of their passenger manager. We note, however, the absence of an ingredient which, on account of its slow growth and imperfect development, causes a large proportion of traffic demoralization, viz: 'Want of confidence in each other,' for their arrangements, although com-

plete, were carefully guarded by the announcement that while goods were thus carried, they were not warranted against robbery or damage, and all baggage was at passenger's risk.' * * * That the comfort of his patrons was early considered by the passenger agent as an incentive to travel is seen later in the report of the Baltimore & Ohio, when in 1833 it was officially suggested 'it is absolutely necessary to the comfort of passengers that carriages used for their convenience should in the future be mounted upon springs or upon some equivalent elastic.' Here are indications feeble, yet none the less marked, of the struggling growth of a determination to meet existing conditions and overcome the obstacles that surround them."

Fall of Rock in a Tunnel.

Tunnel No. 27 of the Cincinnati Southern, near Harriman, Tenn., was recently blocked one whole day, and soon afterward for about five days, by the falling of a large mass of shale on the track; but the trouble was not caused by a furniture car striking the roof, as was reported in the newspapers. Most of this tunnel is lined with timber. Near the southern end there is a large mass of decomposed shale, dipping about 45 degrees toward the south, nearly in line with the axis of the tunnel. The shale is of a slippery nature and has occasionally nearly vertical seams. The mass which slid started without evident cause, breaking away at the vertical seams, and overturned a few bents of the timber lining at the south entrance. The track was cleared the next day, but three days later (October 17), while workmen were clearing away material, another large mass fell, and it took five days to clear it away. While the road was obstructed through freight and passengers were carried from Harriman Junction to Chattanooga over the Southern Railway via Knoxville, a distance of 162 miles, which is just about twice the direct distance.

It is reported in the newspapers that Receiver Felton has asked the court to authorize him to discontinue the use of this tunnel and to build a railroad around the mountain. The care required to conduct traffic through the tunnel safely involves constant and large expenditures.

Chicago Pavements.

At Chicago the Board of Local Improvements, on Oct. 27, refused the petition of property owners to pave Halsted street with cedar blocks. Commissioner of Public Works McGann had recommended the absolute abandonment of cedar block as a street pavement, on the ground that it is only a temporary pavement, and his recommendation has been indorsed by Mayor Harrison, except for paving outlying streets and short streets where traffic is light. An effort is being made to have permanent pavements of granite, asphalt, brick or macadam. The question of street pavements in Chicago has become a most pressing one, many important streets being almost impassable and in a condition that would not be tolerated elsewhere. Commissioner McGann estimates that there are 8,200 miles of cedar block pavements in the city, and that the life of such a pavement is not over ten years, which would mean the repavement annually of 80 miles of streets at an approximate cost of \$2,250,000.

The Western Railroad of Havana.

Press dispatches of Oct. 30 say that the Western Railroad of Havana, extending from Havana, Cuba, westward through the province of Pinar del Rio, is preparing to make considerable improvements. The existing line is to be straightened and some new bridges are to be built. Some of the material is already on the ground. The line is to be extended from the city of Pinar del Rio westward. It is said that the new construction will amount to 30 or 40 miles.

Car Float for the C. & O.

The Jackson & Sharp Co., Wilmington, Del., is building a car float for the Chesapeake & Ohio which will be 250 ft. long, 34 ft. wide and 12 ft. deep. It will have two tracks and will carry 16 cars. It is to be used at Newport News. This boat has nine lines of double keelsons, 42 in. bulkheads, 6 in. side plank and 4 in. bottom plank.

Car Lighting.

Mr. R. M. Dixon, in the October number of the Stevens Indicator, discusses the subject of car lighting, and says that there are now eight electric lighting systems being tried in this country. Four companies propose to light cars by dynamos driven by power obtained from the car axles; three systems use dynamos and engines in the baggage car of the train or carry a special car for this purpose, the steam being supplied either from the locomotive boiler or from a special boiler in the car; and one system depends entirely upon storage batteries. In all of the electric systems it is said to be necessary to use storage batteries. Three gas lighting systems are mentioned, the air gas system, compressed city gas and Pintsch gas, but to this list should be added acetylene gas, which is now being tried on the Pontiac Pacific Junction Railway, as noted in our issues of March 18 and Sept. 23 last. Mr. Dixon further states that in this country there are now in use approximately 200 cars lighted by electricity, 900 by the air gas system, 800 by compressed city gas, and 11,000 by Pintsch gas, making a total of 12,900 cars accounted for. We find by reference to Poor's Manual that at the end of 1897 there were in this country 25,275 passenger and 8,133 baggage, mail and similar cars, making a total of 33,408 cars which are probably supplied with lights. From these figures it is safe to infer that there are now over 20,000, or 60 per cent., of the cars in this country, in which oil is used for lighting.

Chicago River Improvements.

Gen. John M. Wilson, U. S. A., Chief of Engineers, reporting on Chicago harbor and river work, says that the balance available at the beginning of the fiscal year and including the \$400,000 appropriated in June, 1898, was \$409,117, and that the amount necessary to complete the present plan is \$137,000, for which it is recommended that an appropriation be made. The depth of the river is determined by the crowns of the street railroad tunnels, and the report calls attention to the fact that the restricted channel in the Chicago River is hampering to all interests depending upon commerce by water, but no practical plan of radical improvement in the channel has yet been proposed. The funds asked for are for widening the river under the act of June 4, 1897. The report also gives details of the improvements at South Chicago and recommends an appropriation of \$150,000 for the South Chicago harbor and \$100,000 for the Calumet River, to be spent in improvements during the coming fiscal year. The following are the

estimated amounts needed for the improvement of the harbors from South Chicago to Waukegan:

	To Finish.	One Year.
Chicago River	\$137,000	\$137,000
South Chicago Harbor.....	1,009,830	1,150,000
Calumet River	700,000	100,000
Illinois River	357,000	100,000
Illinois and Mississippi Canal.....	3,433,490	1,427,740
Waukegan Harbor .....	.....	5,500

A committee of three members of the Chicago Real Estate Board has commenced the appraisal of 20 pieces of real estate along the Chicago River which the United States proposes to buy or condemn in order to straighten the river by cutting off the points that obstruct navigation. This work will be done under the appropriation of \$400,000 for river improvement made last July, and it is expected that the dredging of the river and rebuilding of docks will be done during this winter. The project contemplates removing 123,100 sq. ft. of land from various points along the river and the construction of about 4,800 linear ft. of docks. (See Railroad Gazette, Jan. 14, p. 30; Feb. 25, p. 145; and paper by U. S. Asst. Engr. Liljencrantz in Jour. West. Soc. Engrs. for June, 1898.)

Kings County Elevated Cars on the Brooklyn Bridge.

The Kings County Elevated Railroad began running trains over the Brooklyn Bridge on Tuesday of this week. These trains were run in similar manner to the other elevated trains now crossing the bridge. For the present all through service will be suspended during the rush hours, and at these times, both morning and evening, the passengers will be carried in the regular bridge cars; but coupon tickets will be sold, giving a person a through trip for a single five-cent fare. Under the agreement which has been reached, the Kings County road pays the Brooklyn Elevated for its share of the bridge service and pays the city a toll of 10 cents a trip for each car over the bridge. The tolls are guaranteed to amount to \$83.33 a day, and for all excess of this number payment will be made at the rate of 10 cents a car. At the New York end the railroad platform has been divided into separate sections for the two roads. A singular clause in the agreement is to the effect that it can be ended at the discretion of either of the parties at 15 days' notice.

The Volunteer Engineers in Porto Rico.

Recent letters have been received by Mr. Thomson, President of the Engineers' Club, from members of the Club who are officers in the First U. S. Volunteer Engineers. Up to that writing the regiment had lost six men, the most fatal illness being typhoid fever. The general good health of the command is largely due to the character of the men in the rank and file, who know better than most volunteer soldiers how to take care of themselves. "The regiment has become famous for its skill in getting the best of everything, and yet we are doing all the dirty and hard work that turns up." Most of the men of the regiment are not very impatient to be mustered out, provided they can get back in the United States early in the spring. A detachment was building a pier at Playa, another a bridge at Ponce. The first battalion had just finished rebuilding an arch bridge destroyed by the Spanish troops, and a detachment was rebuilding a bridge near Aibonita. The road from Ponce to San Juan, 133 kilometers, is described as macadamized all the way and kept in good repair, with arched culverts, some iron bridges and a very creditable class of masonry. Road houses are distributed about every six kilometers, where the repair gangs live, with tools and piles of road metal.

The New Electric Road in Zurich.

It is proposed to use for the new electric road in Zurich a system of contact plates, with a distributor for each section made up of 20 plates. The length of the plates is 1.5 meters, and the distance between them is 2 meters, so that each distributor covers a distance of 66.5 meters. This distance can be diminished at the stations to 10.25 meters. The cars can follow each other at a distance of 70 meters between stations, but at the stations they may be brought close enough to touch one another. Each motor is adapted to be used with overhead trolleys as well as contact plates, and is therefore fitted with current collectors for both systems.

No War Tax on Passengers' Rebate Checks.

The Attorney General of the United States has rendered an opinion that rebate checks issued by railroad conductors for excess fare paid on trains do not come under the clause of the war revenue act requiring a two-cent stamp on every order for the payment of money. The Attorney General holds that the rebate check is a part of the bookkeeping between the railroad company and its employees. In accordance with this opinion, the Commissioner of Internal Revenue has reversed his ruling, made several weeks ago, requiring the payment of the two-cent tax on each rebate check.

Street Accidents in Berlin.

The police authorities of Berlin report the number of accidents from street traffic in the year 1897, as follows:

	No. of Accidents.	Killed.	Badly Hurt.	Slightly Hurt.
Cabs	553	2	92	301
Other passenger vehicles....	134	1	34	63
Fire engines	10	..	..	8
Mail wagons	48	1	15	21
Beer wagons	123	10	38	64
Other heavy wagons.....	342	18	123	166
Butchers' carts	31	1	14	50
Other light freight wagons.	396	2	80	231
Baby wagons, wheelbarrows, handcarts and dogcarts....	75	..	8	38
Undescribed vehicles.....	142	3	26	82
Bicycles	911	1	63	486
Collisions on street railroads	2,897	..	..	..
Collisions of omnibuses....	764	..	..	..
Street car accidents.....	3	..	804	122
Omnibuses .....	..	..	35	100
	42	1,332	1,721	

Further, it is reported that 346 persons were injured in getting on or off the front platform of street cars, and 1,133 in getting on or off the rear platform, and 76 in falling from the roofs (which have seats), ladders and platforms, while 246 were knocked down or run over. This looks like a record of casualties in an important battle; but the railroad man is warned not to take any comfort from it.

Paving in Chicago.

At Chicago, Oct. 21, the contracts previously mentioned in these columns were awarded by the Board of Local Improvements for paving 15 miles of streets at a cost of \$2,000,000, all to be done before Jan. 1. These contracts are for cedar blocks, mac-

adam, granite or asphalt. The courts having decided that the city specifications for brick paving were invalid, it became necessary to reject all such bids. It is announced that the specifications will be changed and new bids asked.

New Sleeping Cars for the Baltimore & Ohio.

It will be remembered that recently the Pullman Palace Car Company built three parlor cars for the Baltimore & Ohio, with toilet-rooms for ladies considerably larger than usual. (Described in the Railroad Gazette, Aug. 5, p. 566.) The same company has now built eight new sleepers for the New York-St. Louis line of the B. & O., and in these the ladies' retiring room has much more space than was ever before allowed in sleeping-cars. These new cars are said by the Pullman people to be the finest they ever turned out, and the ladies' retiring room contains, besides other toilet necessities, a dresser with a long pier glass. The cars are finished in vermillion wood, decorated with inlaid marquetry work. The upholstery on the seats and the backs of the seats is different from any heretofore used, being a moquette with a dark-green border and a center pattern of bright color. A similar design has been applied to the ceiling, giving the car an arabesque effect. These cars have wide vestibules and air pressure water, and are lighted with Pintsch gas. Oval windows of opalescent glass constitute a pleasing feature of the general design.

"The Chief" and the Navy.

Com. G. W. Melville, Chief of the Bureau of Steam Engineering, U. S. N., naturally has a good many interesting things to say in his annual report as the result of our latest war experience. Among other points brought out, he speaks of the great tactical advantages of water-tube boilers.

Special attention is directed to the recommendation for outfitting a second repair ship. The Vulcan was of inestimable value off Santiago, and that there is no more important feature to-day in the navy than the maintenance of such a floating machine ship with a large fleet. A second distilling ship is being fitted to take the place of the Iris, which has started for the Pacific with the Oregon and the Iowa.

Of the remarkable performances of the Oregon Com. Melville says: "She steamed over 14,500 miles, stopping only for coal and not being delayed an hour anywhere through any derangements of the machinery. Stopping at Key West only long enough to coal, she took her place in the blockading fleet at Santiago and was always ready for service. This alone would have given her an unparalleled record among battle-ships, but the culmination came in the great battle of July 3, when she surpassed herself. Always ready for action, she speedily attained a power greater than that developed on the trial, giving a speed (on account of greater displacement and foul bottom) only slightly less than then attained, and distancing all the other ships except the Brooklyn, which is five knots faster. Every official report comments on her wonderful speed, and it is generally believed that but for it one at least, and possibly two, of the Spanish ships might have escaped."

Street Railroad Franchises in Chicago.

In a decision handed down Oct. 24 the Supreme Court of Illinois holds that the City Council of Chicago may insist upon compensation for street railroad franchises and that it can make different rates for different companies, insisting on compensation from one company and requiring none from others. The decision was given in an appeal by the Chicago General Railway Co. The ordinance granting the company permission to operate its line imposes a license fee of \$500 per mile of track. The company protested against the payment of this fee. The court holds that the company accepted the franchise without conditions, and that the Council had the right to provide for the compensation.

Abandonment of the Honesdale Gravity Railroad.

It is announced that the Gravity Railroad of the Delaware & Hudson Canal Co., from Carbondale to Honesdale, Pa., which is used to carry coal from the company's mines to the canal boats, will be abandoned, and it is possible that the canal itself may be abandoned at the end of the present season. The Gravity Railroad has been for some time worked at a loss, and the coal is now to be carried by the Erie & Wyoming Valley Railroad, with which the Delaware & Hudson has made a contract. This railroad, from Carbondale to Honesdale, is that on which was run the first locomotive that ever turned a wheel in America. Here on Aug. 3, 1829, the Stourbridge Lion was run by Horatio Allen. The Gravity road has been in use for 70 years and the canal for 71 years.

LOCOMOTIVE BUILDING.

The Pittsburgh, Bessemer & Lake Erie is in the market for seven new locomotives.

The Rogers Locomotive Works are building two engines for the St. Joseph & Grand Island.

The Boston & Albany has placed an order with the Schenectady Locomotive Works for two engines.

The Baldwin Locomotive Works are building one six-wheel switching engine for the Woodward Iron Co.

The Chicago & Northwestern has placed an order with the Schenectady Locomotive Works for six more engines.

We understand that the Oregon Short Line will probably place its order for engines with the Brooks Locomotive Works.

We understand that the Norfolk & Western has increased its order for engines with the Baldwin Locomotive Works from 10 to 30.

The Schenectady Locomotive Works have an order for two engines, we believe, from the New York Central & Hudson River.

The Baldwin Locomotive Works are building one four-wheel switching engine, narrow gage, for the Lehigh Coal & Coke Co.

The Long Island has placed an order with the Brooks Locomotive Works for three engines, and contemplates having eight rebuilt.

It is stated that the Intercolonial has ordered 12 of the engines referred to in our last issue from the Baldwin Locomotive Works and will have three built in Canada.

The Santa Fe Pacific has awarded the contract for the locomotives referred to last week, giving five to the Baldwin Locomotive Works and 10 to the Dickson Locomotive Works.

The Brooks Locomotive Works have received an order to build one sample mogul engine for the Mexican Central. This is probably the engine described in this column last week.

The Baldwin Locomotive works are building three four-wheel narrow gage electric locomotives of 100 h.p. and to weigh 24,000 lbs. each for the Berwind-White Coal Mining Co., and one of the same type for the Monongahela Coal & Coke Co., making a total of 10 electric locomotives of this type that will have been built by the Baldwin Locomotive Works.

CAR BUILDING.

The Manitoba & Northwestern is in the market for 30 stock cars.

The Mexican Railroad has ordered 50 freight cars from the St. Charles Car Co.

The Wason Mfg. Co. is building four cars for the New England Gas & Coke Co.

The Erie has placed an order with the Michigan-Peninsular Car Co. for 1,000 coal cars.

We are reliably informed that the Armour Co. is asking bids on 200 or 300 refrigerator cars.

The Southern Indiana has placed an order with the Barney & Smith Car Co. for 150 freight cars.

The Ohio Southern has placed an order for 200 box cars of 60,000 lbs. capacity with the Ensign Mfg. Co.

Pullman's Palace Car Co. is building six cars for first-class passenger service for the Union Pacific.

Pullman's Palace Car Co. has received an order to build 1,000 freight cars for the Chicago & Northwestern.

We understand that the Pittsburgh, Bessemer & Lake Erie is arranging to buy between 500 and 1,000 more steel cars.

H. J. Heinz & Co. of Pittsburgh have placed an order with the Middletown Car Works for six of the cars referred to in our issue of Sept. 2.

As we go to press we learn that H. F. Whitcomb, General Manager of the Wisconsin Central, is expected in New York to arrange for ordering the 1,000 cars referred to in our last issue.

In our issue of Oct. 21 we noted an order of 100 box and 300 gondola cars placed by the Columbus, Sandusky & Hocking with the Ohio Falls Car Mfg. Co. The same works will build 30 flat car bodies for the road.

The Baltimore & Ohio is having 2,000 freight cars built by the Missouri Car & Foundry Co., and 500 by the South Baltimore Car Works. We understand that from 1,000 to 3,000 more cars will be ordered, some of which will be of steel.

In our issue of April 8 we noted an order of the Pennsylvania for 1,000 steel cars of 100,000 lbs. capacity placed with the Schoen Pressed Steel Co., and stated that the order would probably be duplicated. We now understand that the additional order is being arranged for and may possibly be further increased. The road has also ordered 400 more class G1 low-side, drop-end gondola cars, 150 from Murray, Douglas & Co., and 100 from Billmeyer & Small Co., and has asked bids on 3,000 box cars.

The Northwestern Elevated of Chicago is asking bids on trucks for the electric cars referred to in our issue of Oct. 14.

BRIDGE BUILDING.

ASHTON, R. I.—It is stated that Cumberland township has appropriated \$9,000 and Lincoln township \$8,000, for a bridge to be built across the Blackstone River at Ashton.

BANGOR, ME.—The Bangor, Hampton & Winterport Ry. (electric) will build a bridge and one or more trestles. (See Electric Railroad Construction column.)

CUMBERLAND, MD.—Press reports state that the George's Creek & Cumberland R.R. has completed an iron trestle at Nedam, near Vale Summit. It will remove two curves from the road. The wood trestle, at Winchester Bridge, is next to be replaced by iron.

ELLCOTT CITY, MD.—The commissioners of Howard County have called the attention of the Baltimore County Commissioners to the reported dangerous condition of the bridges at Elkridge, Ilchester and Woodstock, over the North Branch of the Patapsco River, which divides the two counties, and ask for a conference about the matter. Wm. J. Robinson, Clerk Howard County; M. F. Connor, Clerk Baltimore County, Towson, Md.

HAMILTON, O.—It is reported that the commissioners of Butler County have decided to build a bridge over Seven Mile Creek in Somerville, to cost about \$40,000.

NEW YORK, N. Y.—In the departmental estimates of New York City for 1899 \$406,522 is allowed for bridges.

POCAHONTAS, ARK.—The Pocahontas Bridge Co. has had plans prepared for the proposed bridge across Black River, by M. S. Hasie, Fort Worth, Tex. The structure will be of steel and will cost \$30,000. J. M. Rose is President of the company. (Feb. 11, p. 108.)

RACINE, WIS.—Press reports state that plans have been prepared for a viaduct to cross the railroad tracks and the river on Huron St. If built it will cost about \$85,000.

VICTORIA, B. C.—Sealed bids will be received by the chief commissioner of lands and works until Nov. 30, for building a steel arch bridge across the Gorge, Victoria Arm. W. S. Gore, Deputy Commissioner of Lands and Works.

WASHINGTON, D. C.—General John M. Wilson, Chief of Engineers, in his report to the War Department, says, in regard to the proposed memorial bridge across the Potomac, from the naval observatory grounds to the Arlington estate:

A preliminary estimate made by Colonel Allen shows that a bridge at the locality with masonry piers and steel superstructure, capable of ornamentation, having three fixed spans and one draw span with roadway 40 ft. wide and two sidewalks, each 10 ft. wide, and with approaches affording the same width of travel way, can be built for about \$1,355,000. I concur in the opinion of Colonel Allen, however, that the character of bridge should not be definitely decided upon until after the subject has been given further study.

Concerning the bridges at either end of Massachusetts Ave., the report says:

Plans are submitted for a bridge across the Eastern Branch of the Potomac, in line with Massachusetts avenue extended eastward, with fixed spans and having a total length, including approaches of 2,517 ft., and width of 52 ft. between railings, and the cost of its construction is estimated to be \$441,208. The plans provide accommodations for ordinary highway traffic and for street car tracks, as required by the law; also for the construction of a draw should one be required in the future. The estimated cost of a bridge with a draw (swing span on a pivot pier) is \$476,845, but the necessity for a draw is not now apparent. Colonel Gaillard submitted designs and estimates for both the stone arch bridge and steel bridge with stone foundations at the locality indicated. The estimated cost of a stone arch bridge over Rock Creek at Massachusetts avenue is \$568,545, and for the steel bridge, \$199,204. General Wilson recommends a stone arch.

WAVERLY, IA.—Bids are asked for until Nov. 15 for building a bridge across Cedar River. It is understood that the bridge will cost about \$15,000. (July 29, p. 554.)

WEST CHESTER, PA.—A jury consisting of David J. Scott (foreman), Francis H. Gheen and Henry C. Baldwin, all of West Chester, recommends that the County (Chester) build a bridge, to have a span of 50 ft., over Chester Creek. Wilmer Pennypacker, County Clerk; Walter A. McDonald, Surveyor.

WICHITA, KAN.—H. H. Hendershot writes us regarding the proposed viaduct on Douglas ave., that construction has been deferred owing to the opposition of property owners, until after the spring elections. (Oct. 21, p. 766.)

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Rome, Watertown & Ogdensburg.—Quarterly, guaranteed, 1½ per cent., payable Nov. 15.

Pennsylvania.—Semi-annual, 2½ per cent., payable Nov. 30.

Consol. Tract. (Pittsburgh).—Preferred, 3 per cent., payable Nov. 15.

Duquesne Traction (Pittsburgh).—Two per cent., payable Nov. 14.

Glens Falls, Sandy Hill & Ft. Ed.—Quarterly, 1¼ per cent., payable Nov. 1.

Metropolitan (K. C., Mo.).—Quarterly, 1 per cent., payable Nov. 1.

Pittsburgh Traction.—Three and one-half per cent., payable Nov. 14.

New Orleans & Carrollton.—Quarterly 1¼ per cent., payable Oct. 24.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

American Society of Civil Engineers.—Meets at the house of the Society, 220 West Fifty-seventh street, New York, on the first and third Wednesdays in each month at 8 p. m.

Association of Engineers of Virginia.—Holds its formal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building, Roanoke, at 5 p. m.

Boston Society of Civil Engineers.—Meets at 715 Tremont Temple, Boston, on the third Wednesday in each month at 7:30 p. m.

Canadian Society of Civil Engineers.—Meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday at 8 p. m.

Central Railway Club.—Meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

Chicago Electrical Association.—Meets at Room 1737, Monadnock Building, Chicago, on the first and third Fridays of each month at 8 p. m. J. R. Cravath, secretary.

Civil Engineers' Club of Cleveland.—Meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

Civil Engineers' Society of St. Paul.—Meets on the first Monday of each month except June, July, August and September.

Denver Society of Civil Engineers.—Meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

Engineers' Club of Cincinnati.—Meets at the rooms of the Literary Club, 25 East Eighth street, on the third Thursday of each month, excepting July and August, at 7:30 p. m.

Engineers' Club of Columbus (O.).—Meets at 12½ North High street on the first and third Saturdays from September to June.

Engineers' Club of Minneapolis.—Meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

Engineers' Club of Philadelphia.—Meets at the house of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month at 8 p. m., except during July and August.

Engineers' Club of St. Louis.—Meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

Engineers' Society of Western New York.—Holds regular meetings on the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

Engineers' Society of Western Pennsylvania.—Meets at 410 Penn avenue, Pittsburgh, Pa., on the third Tuesday in each month at 7:30 p. m.

Locomotive Foremen's Club.—Meets every second Tuesday in the clubroom of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.

Montana Society of Civil Engineers.—Meets at Helena, Mont., on the third Saturday in each month at 7:30 p. m.

New England Railroad Club.—Meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month.

New York Railroad Club.—Meets at 12 West Thirty-first street, New York City, on the third Thursday in each month at 8 p. m., excepting June, July and August.

Northwest Railway Club.—Meets on the first Tuesday after the second Monday in each month at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

Northwestern Track and Bridge Association.—Meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

St. Louis Railway Club.—Holds its regular meeting on the second Friday of each month at 8 p. m.

Southern and Southwestern Railway Club.—Meets at the Kimball House, Atlanta, Ga., on the second Thursday in January, April, August and November.

Technical Society of the Pacific Coast.—Meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

Western Foundrymen's Association.—Meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is secretary.

Western Railway Club.—Meets in Chicago on the third Tuesday of each month at 2 p. m.

Western Society of Engineers.—Meets in its rooms on the first Wednesday of each month at 8 p. m., to hear reports and for the reading and discussion of papers. The headquarters at the Society are at 1736-1739 Monadnock Block, Chicago.

Texas Railway Club.

The Texas Railway Club held a two days' meeting commencing Monday, September 19, at the Hotel Del Mar, Rockport, Texas. After the opening exercises a substitute resolution in regard to the interchange of cars in Texas was discussed and adopted. The resolution recommended that inspectors be instructed not to issue defect cards against the delivering lines on cars passing in interchange for defects for which the owners are responsible; that repairs to "owner's defects" on foreign cars be made by delivering lines where possible to do so, and when such repairs cannot be made at intermediate points that such defects be passed on record, provided they do not render the car unsafe to run.

Mr. F. Hufsmith, Superintendent of Motive Power of the International & Great Northern, read a paper entitled "Safety in Train Air Brake Appliances." A paper presented by Mr. A. S. Grant, Master Mechanic of the Houston, East & West Texas, at a former meeting, and entitled "Necessity of Harmony in the Departments of Railway Service," was then discussed.

At the second session Mr. N. L. Smitham, Master Mechanic of the Texas Midland, read a paper, "Economy in the Increased Capacity of Cars," which was followed by discussions of a paper by Mr. S. R. Tuggle, "Economy in the Use of Fuel," and one by Mr. James McGee, Master Car Builder of the Houston & Texas Central, "Car Inspection," both of which were read at a former meeting.

The next meeting will be held at Bryan, Texas, commencing Monday, April 17, for which the following programme will be arranged:

New Papers.—"The Use of Electric and Pneumatic Power and Tools as Applied to Shop Practice," by Mr. William Jennings, Superintendent Mechanical Department, Mexican International; "The Impressions of a Motive Power Man as Gathered in a Trip Abroad," by Mr. R. H. Soule, Baldwin Locomotive Works; "The Responsibility of a Cast Chilled Car Wheel Maker, Its Uses and Abuses," by Mr. E. S. Marshall, Missouri Car & Foundry Company; "Relative Merits of Improved Metal Draft Gear," by Mr. J. R. Cade, Master Car Builder, Southern Pacific.

The papers presented at the last meeting on "Safety in Air Brake Appliances" and "Economy in the Increased Capacity of Cars" will be discussed.

Civil Engineers' Club of Cleveland.

The semi-monthly meeting was held in Case Library, Cleveland, O., October 25, at 8 p. m., with President Osborn in the chair. There were present 25 members and 16 visitors. Mr. Clarence M. Barber, member of the Club, presented a paper on "The Electric Motor in Shop and Mine." Owing to the unavoidable absence of the author, the paper was read by the Secretary. The paper treated of the development of the electric motor in its different forms, and of the different industries to which it has been applied. A comparison was made of the economies of steam and electric installations in manufacturing concerns, and the advantages and disadvantages of each pointed out. The advantages gained in the coal mining industries by the introduction of electricity were referred to, this agent supplying light, power, ventilation, and all the necessities of mining. The efficiencies of electric and pneumatic drills were compared, the advantage still remaining with the pneumatic drill where percussion work is required. Electric motors are of peculiar advantage in the mountain mining regions, where water falls are utilized for power, since energy can be transmitted for long distances and used directly in the mines. The subject was further discussed by a large number of the members and visitors present.

Engineers' Club of Philadelphia.

A meeting of the Club will be held Nov. 5. After the business session papers will be read on "Notes on Recent Progress in Electrical Engineering," by Carl Hering, and "Coal Handling Machinery," by Charles Plez.

New York Academy of Sciences.

On the evening of Oct. 31 Mr. George W. Blodgett, Electrical Engineer of the Boston & Albany, delivered a lecture before the Section of Astronomy and Physics of the New York Academy of Sciences, on "Railroad Signalling." Mr. P. H. Dudley is Chairman of this section. The lecture was illustrated by a large number of well-selected stereopticon views and was listened to by a good-sized audience. Mr. Blodgett introduced his subject by a brief general review of railroad progress, and showed pictures of railroad construction and structures, locomotives, etc., illustrating the history of the past 75 years. The main part of the lecture described signalling in a popular way for a non-technical audience, and the illustrations consisted largely of outdoor views, which had been gathered by Mr. Blodgett himself on various railroads. These showed semaphores and automatic disk signals on half a dozen roads, and a number of old-style signals. Enlarged views of apparatus were also given. The lecturer gave a lucid description of the principle of mechanical interlocking.

Rochester Engineering Society.

A meeting was held Oct. 21 at the Reynolds Library, Rochester. Mr. H. A. Nicholl read a paper describing the storage battery now being placed at the power house of the Rochester Railway Company. The battery at the power station was inspected by the Society after the paper had been presented.

Railway Signaling Club.

This Club will meet at the Great Northern Hotel, Chicago, Tuesday afternoon, Nov. 8. The subjects for discussion will be bracket posts and bolt locks.

PERSONAL

—Mr. John F. Phillips, Treasurer of the Chicago, Rock Island & Pacific, died in Chicago, Oct. 31. He was born in Brattleboro, Vt., in 1837, and entered the service of the Rock Island in 1860 as a storekeeper in the supply department. His entire railroad service has been in the employ of the Rock Island.

—Mr. Darius Miller, who was recently appointed Chief Traffic Executive of the Great Northern, has been connected with the Missouri, Kansas & Texas since May 20, 1893, when he was appointed Traffic Manager of that road. He entered railroad service in 1877 as a stenographer in the General Freight Office of the Michigan Central in Detroit. In 1881 he became Chief Clerk to the General Manager of the Memphis & Little Rock, which position he held for two years, when he became General Freight and Ticket Agent of the same road. In June, 1887, he was appointed General Freight and Passenger Agent of the St. Louis, Arkansas & Texas, and two years afterward became Traffic Manager. Before he was connected with the Missouri, Kansas & Texas, Mr. Miller was Traffic Manager of the Queen & Crescent route.

—Col. George E. Waring, Jr., died at his home in New York City at 7:35 a. m. last Saturday, of yellow fever. He took the fever while on duty in and about Havana, where he went to make an examination of the conditions for a report to the United States Government. It is announced that, fortunately, Col. Waring's report was prepared and practically complete before he was taken sick.

George E. Waring was born in Poundridge, N. Y., July 4, 1833. He was trained for a civil engineer, and also studied agricultural chemistry and took great interest in developing improved methods of agriculture. At the breaking out of the Civil War he was in the employ of the Park Department of New York City. He went to the front as a major in a cavalry regiment, and finally became colonel of the Fourth Missouri Cavalry and was mustered out of service in 1866. He became well known as a writer on agricultural and sanitary topics and as a practitioner, but the yellow fever epidemic in Memphis, Tenn., in 1878, made him famous. He introduced a system of drainage and sanitation there which completely revolutionized the condition of the city. In December, 1894, he was appointed Commissioner of Street Cleaning in New York City, and his work during the few years that he held that office gave him still further fame, and it is not too much to say that he introduced a new era in street cleaning in that city also.

The daily newspapers throughout the country have printed such full accounts of Col. Waring's life and work that it is unnecessary for us to say more at this time. We do not suppose that as a sanitary engineer Col. Waring will stand in the first rank when the final estimate of his work is made up. He was fertile, inventive and bold, but he lacked the final quality of calm and patient judgment which an engineer must have to give him the highest place. He was, however, a very capable executive officer and organizer, and he was full of fire and energy and entirely without fear. These qualities, added to downright honesty, enabled him to do work of great value in the world, and his death is a national loss, particularly so at this moment, when we have assumed such great responsibilities toward the hotbeds of yellow fever.

Col. Waring was a handsome man with a fine physique, a horseman, swordsman and athlete, and nobody looking at him and seeing him move would have suspected that he was 65 years old; he might easily have passed for a man of anywhere between 50 and 55. He was a delightful companion, courteous, cultivated, ready and even enthusiastic in talk, and yet not a bit of a monologuer. He not only liked to talk, but to hear other men talk. He was a member of the Century Club, the Players and the New England Society, and President of the City Club of New York.

ELECTIONS AND APPOINTMENTS.

Baltimore & Ohio.—Lyman McCarty, who has been General Eastern Passenger Agent at New York, has been promoted to the position of Assistant General Passenger Agent. His headquarters will remain at 434 Broadway. S. B. Hege, for seven years Division Passenger Agent at Washington, will be made General Agent of the passenger department in Washington.

Blue Ridge Dispatch.—The office of General Manager, held by F. M. Whittaker, has been moved from Louisville, Ky., to Cincinnati, O.

Canada Atlantic.—A. G. Peden, General Auditor, has resigned. (Oct. 28, p. 785.)

Chicago & Eastern Illinois.—Chas. Butler has been appointed Master Mechanic at Mernone, Ill.

Chicago & Northwestern.—Chas. S. Halladay, New England Traveling Freight Agent, with headquarters at Boston, Mass., has resigned. Mr. Halladay has occupied this position for 13 years.

Choctaw, Oklahoma & Gulf.—The office of Chief Engineer, held by F. A. Molitor, has been moved from South McAlester, Ind. Ter., to Little Rock, Ark.

Detroit & Lima Northern.—H. A. Wilson has been appointed City Passenger and Ticket Agent at Detroit, Mich.

T. M. Downing, heretofore Master Mechanic of the Columbus shops of the Columbus, Sandusky & Hooking, has been appointed Master Mechanic of

this line, with headquarters at Tecumseh, Mich., effective Nov. 1, succeeding J. W. Stokes, resigned.

Erie.—Edward White, Treasurer, has resigned. The vacancy has been filled by the election of Andrew Donaldson, Third Vice-President, which position he also retains.

Evansville & Terre Haute.—T. J. Hyman, Auditor and Car Accountant, has resigned. His position will be filled by W. K. Allen, heretofore Assistant Auditor, with headquarters at Evansville, Ind.

Flint & Pere Marquette.—P. F. Gaines has been appointed Assistant General Freight Agent, with office at Saginaw, Mich.

Grand Trunk.—W. A. Bell has been appointed Assistant Master Mechanic at Chicago, succeeding E. D. Jameson, promoted. (Oct. 28, p. 785.)

J. A. Miller, formerly Traveling Agent, has been appointed General Agent at Seattle, Wash.

Great Northern.—Darius Miller, Third Vice-President and Traffic Manager of the Missouri, Kansas & Texas, has been appointed Chief Traffic Executive, succeeding Francis B. Clarke, General Traffic Manager, with headquarters at St. Paul, Minn.

Gulf, Colorado & Santa Fe.—F. K. Park has been appointed Auditor, succeeding W. W. Pope, resigned. His headquarters are at Galveston, Tex.

Holly River & Addison.—The officers of this company, referred to in the Construction Column, are: President, John T. McGraw, Crafton, W. Va.; General Manager, Geo. A. Hechmer; Superintendent of Construction, J. P. White; Chief Engineer, T. G. Baylor, Palmer.

Indiana, Illinois & Iowa.—C. H. Smith, heretofore General Manager of the Pittsburgh, Lisbon & Western, has been appointed Superintendent of Construction, with headquarters at Kankakee, Ill.

Intercolonial.—J. B. Lambkin, District Passenger Agent at Montreal, has been transferred to Halifax, N. S., as District Passenger Agent. H. A. Price, District Passenger Agent at Halifax, has been transferred to Montreal, succeeding J. B. Lambkin. J. J. Wallace, heretofore Superintendent of the Halifax & St. John District, has been appointed General Freight Agent.

Kansas City, Pittsburgh & Gulf.—At the annual meeting held in Kansas City, Oct. 27, Norman E. Ream and Frank O. Lowden, Directors, resigned. Robert Gillham, General Manager and Chief Engineer, and C. A. Braley, both of Kansas City, Mo., were elected to succeed them.

Kaslo & Slocum.—At the annual meeting held in Victoria, B. C., Oct. 16, Robert Irving was elected President, succeeding D. J. Munn. Geo. F. Copeland was elected Vice-President and Treasurer, succeeding A. Guthrie. Jas. Jeffries was elected Secretary. The duties of the office of Secretary were heretofore performed by Robert Irving, Traffic Manager.

Lehigh Valley.—J. W. Lattig, Superintendent of Telegraphs and Signals, having resigned, the duties of the office will be assumed by J. H. Jacoby, Division Operator, Bethlehem, Pa. (Oct. 21, p. 767.)

New England.—At the annual meeting held in Hartford, Conn., Oct. 27, Edward G. Buckland of Providence and John Doane of Chicago were the newly elected Directors.

New Paltz & Walkill Valley.—W. G. Rock has resigned as Superintendent. E. E. Hawkins has been appointed to succeed him, with headquarters at New Paltz, N. Y.

New York, Susquehanna & Western.—Edward White, Treasurer, has resigned. He is succeeded by Andrew Donaldson.

Oregon Short Line.—At the annual meeting held in New York, Oct. 27, Geo. J. Gould, O. H. Kahn, E. H. Harriman, Horace G. Burt and W. D. Cornish were elected new members of the Board of Directors. Mr. Cornish was elected President of the road, succeeding Samuel Carr. Oliver Ames, Horace G. Burt, E. H. Harriman, O. H. Kahn and Winslow S. Pierce comprise the newly appointed Executive Committee.

E. C. Manson has been appointed Chief Dispatcher of the Idaho Division, succeeding W. A. Whitney, resigned.

Pittsburgh, Lisbon & Western.—Geo. W. Dixon has been appointed to the newly created position of Trainmaster, with headquarters at Lisbon, O. K. E. Baringer, who was recently appointed General Manager, succeeding C. H. Smith, will also perform the duties of his old office, that of Auditor and General Freight and Passenger Agent. (Oct. 28, p. 785.)

Santa Fe, Prescott & Phoenix.—F. L. Parriott has been appointed Chief Dispatcher at Prescott, Ariz., succeeding H. C. Storey.

Seaboard Air Line.—C. H. Chappell, Jr., has been appointed Northwestern Freight and Passenger Agent, with headquarters at Chicago. Mr. Chappell was heretofore Soliciting Freight and Passenger Agent at Memphis, Tenn. Chas. L. Smith has been appointed Travelling Freight Agent, representing the railroad and steamship lines of this company, with headquarters at 371 Broadway, New York, succeeding H. I. Norvell, Commercial Agent, transferred.

Southern.—L. L. McCleskey, heretofore Commercial Agent at Atlanta, Ga., has been appointed Division Freight Agent, with headquarters at same place.

Stuttgart & Arkansas River.—A. V. Stafford, heretofore Auditor, has been appointed Manager for the Receiver of this line, succeeding J. B. Heckler, deceased. His headquarters are at Stuttgart, Ark.

Tacoma & Columbia River.—At a meeting held in Tacoma, Wash., Oct. 20, the company was reorganized with the following officers: Wm. Bailey, President and General Manager; Samuel Collyer, First Vice-President and Assistant General Manager; Wm. Jones, Second Vice-President; E. G. Dorr, Secretary; Calvin Phillips, Treasurer; Ira T. Towne, General Counsel, and E. G. Dorr, Superintendent. The following are the Directors: Wm. Bailey, Samuel Collyer, Wm. Jones, Calvin Phillips, A. M. Ingersoll, Henry Hewitt, W. C. Wheeler, Ira T. Towne and C. M. Shultz.

GALVESTON, LA PORTE & HOUSTON.—Judge Bryant of the United States District Court, at Galveston, Tex., on Oct. 27, confirmed the sale of this road to L. J. Smith, made Oct. 4. The judge reserved his decision as to the date of turning over the property. (Oct. 14, p. 751.)

Union Pacific.—E. C. Harris has been appointed Superintendent of the Wyoming Division, succeeding L. Malloy at Cheyenne, Wyo.

At the annual meeting of the Board of Directors, Winslow S. Pierce was chosen Chairman of the Board and General Counsel. E. H. Harriman, heretofore Chairman of the Board, was elected Chairman of the Executive Committee.

The following changes took effect Nov. 1: On the Kansas Division and on the Colorado Division the General Superintendents, J. O. Brinkerhoff, heretofore General Superintendent of the Kansas Division, with headquarters at Kansas City, and W. A. Deuel, heretofore General Superintendent of the Colorado Division, with headquarters at Denver, Col., have assumed the title of Superintendents. Henry E. Flavin, Assistant Superintendent of the Nebraska Division at Omaha, was transferred to Denver. He was succeeded by E. R. Griffin. A. T. Palmer, heretofore Superintendent at Kansas City, has become Assistant Superintendent of the first two divisions of the Kansas Division, and D. C. Bevard, heretofore Superintendent at Cheyenne Wells, Col., has become Assistant Superintendent of the Third and Fourth Districts of the Kansas Division, and of the Union Pacific, Lincoln & Colorado branch.

Vandalia.—Chas. Butler, foreman of the shops at East St. Louis, has resigned. He is succeeded by Otto Burgert.

Vicksburg, Shreveport & Pacific.—At the annual meeting held in Monroe, La., Oct. 3, A. Strong was elected a Director in place of W. S. Jarvis, deceased.

Victoria & Sidney.—At the annual meeting held in Victoria, B. C., Geo. Riley was elected President, succeeding Julius Brethour, and A. H. Harman was elected Auditor, succeeding Geo. H. Morkill. R. L. Drury was elected a Director, succeeding Henry Brethour.

Western Maryland.—At the annual meeting held Oct. 19, Geo. B. Baker was elected a Director, succeeding G. S. Haines.

West Shore.—J. J. McCarthy has been appointed General Western Passenger Agent, with office at 205 South Clark street, Chicago, Ill., vice William Cadwell, resigned. The appointment is effective Nov. 1. Mr. McCarthy has been heretofore Canadian Passenger Agent of the New York Central & Hudson River at Toronto, Ont.

RAILROAD CONSTRUCTION, New Incorporations, Surveys, Etc.

AMHERST & EASTERN.—The taxpayers of Amherst, N. S., have authorized the Council to give a bonus for a road to be built from Amherst east 20 miles to a point on the Gulf of St. Lawrence. J. A. Dickey of Amherst, N. S., is Secretary of the road. (Sept. 9, p. 656.)

ATLANTIC & LAKE SUPERIOR.—Active preparations are reported in progress for perfecting the plan to make Paspébiac, Que., on the Baie des Chaleurs Division, an ocean steamship point. Work is being vigorously pushed on the large pier which runs out into deep harbor 1,600 ft. from the bar at Paspébiac. It will accommodate vessels of the largest tonnage, and at low water give a depth of 36 ft. The intention is to have the pier and railroad completed by December. The road is now within three miles of Paspébiac, and the contractors are preparing to bridge the Bonaventure River. (Oct. 7, p. 732.)

BALTIMORE & OHIO.—The extension of the switch from Alexandria Junction to the main depot in Hyattsville, about 400 ft., is completed.

CARIBOO-OMINECA CHARTERED COMPANY.—This company which was granted a charter at the last session of the British Columbia Legislature, will shortly begin building a road from Victoria, B. C., to run north to Cariboo. The charter includes improvement of the navigation of the Fraser, Nechaco and the Stewart rivers. R. G. Tatlow of Victoria, B. C., is General Manager.

CARP, ALMONTE & LANARK.—Work is to begin soon on this road, which was chartered some time ago. Dr. Raines, W. Stafford and Andrew Bell, C. E., all of Almonte, have recently taken hold of the plan. The proposed line is to run from Carp, near Ottawa, a point on the Ottawa, Arnprior & Perry Sound line of the Canada Atlantic, southwest via Almonte to a connection with the Canadian Pacific and the Grand Trunk near Madoc.

CHICAGO, INDIANA & EASTERN.—Rails are laid into Swayzee, Ind., and regular train service is established. H. E. Drew of Fairmount, Ind., is General Manager. (Oct. 7, p. 732.)

CHIHUAHUA & PACIFIC.—Grading is completed for 40 km. (25 miles) and track is laid for 10 miles on this line from Chihuahua, Mexico, west to Guerrero. Edward S. Safford of Chihuahua is Chief Engineer. (Sept. 16, p. 678.)

CHOCTAW, OKLAHOMA & GULF.—Track is laid to Weatherford, Okla. Ter., on the extensions west, and that portion of the line was open for business Oct. 30. (Sept. 2, p. 638.)

COAST RAILWAY OF NOVA SCOTIA.—L. E. Baker, President and General Manager of the Yarmouth (N. S.) Steamship Co., recently made a tour of this road with General Manager and Chief Engineer L. H. Wheaton. It is announced that the Yarmouth Steamship Co., and an English syndicate, in which some Halifax capitalists will be associated, will take over the road and complete it at once to Halifax. (Oct. 21, p. 768.)

COLUMBUS, LIMA & MILWAUKEE.—The earth-work has been repaired on the grade from Dorninton, on the Findlay, Ft. Wayne & Western, to Kalida, and rails are being laid this week. The road as projected is to run from the coal fields in Southern Ohio through Columbus and Lima to Defiance. B. C. Faurot of Lima, O., is among those interested. (Oct. 7, p. 732.)

DALLAS TERMINAL RAILWAY AND UNION DEPOT.—At a meeting of the Directors held at Dallas, Tex., Oct. 29, it was voted to cancel all the outstanding bonds and mortgages, and to hold a stockholders' meeting Dec. 10 for the purpose of amending the charter to permit the extension of the lines to Fort Worth, 31 miles, and making an issue of \$1,000,000 bonds for this extension. It is proposed to begin work in January. (Oct. 28, p. 787.)

DETROIT & MACKINAC.—Grading is reported in progress on the extension of this line from Onaway northwest about 24 miles to Cheboygan. It is stated that the company proposes to build as far as Black River this season. The line was completed to Onaway last year.

DULUTH & NORTHEASTERN.—Grading is reported completed for five miles from the Bassett Lake end of this road, which is projected to run from a point on the Duluth & Iron Range, near Bassett Lake, southeast about 36 miles to Island Lake, on the Colquett River. Rails have been received for laying the entire distance. Frederick Weyerhaeuser of St. Paul is among those interested. (Sept. 23, p. 696.)

GEORGIA & ALABAMA.—Surveys are in progress for the G. & A. terminal at Savannah, and it is probable that the contracts will be let in a few weeks for grading, track laying, bridges, etc. (Oct. 14, p. 751.) The plans call for building about 20 miles of road, for the digging of slips and for filling in land. There will be one drawbridge. (Official.)

GREAT NORTHERN.—Surveys are completed for the cut-off from Coon Creek, Minn., to run north about 50 miles via Cambridge to Brook Park. (Oct. 28, p. 786.) The company expects to begin work next spring. (Official.)

Track laying is reported completed into Walker, Minn., 13 miles, on the extension from Akely north to Cass Lake, on the new Fosston branch.

HOLLY RIVER & ADDISON.—Grading is in progress on this line from Palmer Junction, W. Va., southwest 31 miles to Addison. Grading is completed to Diana, 18 miles, and track is laid for two miles from Holly toward Diana. The work is being done by the company. (Sept. 23, p. 696.) The officers are given under Elections and Appointments.

INVERNESS & RICHMOND.—A party of railroad capitalists and investors are visiting Inverness County, Nova Scotia, to inspect this proposed line. Among the party are V. W. Bones and Peter Ryan of Toronto, who are interested in the road.

IOWA CENTRAL.—Negotiations are now in progress with the Wabash for the joint use of its line between Caradova, Ia., and Des Moines. (Oct. 28, p. 786.) If a satisfactory agreement can be reached, and certain agreements now pending in the intermediate territory between Cordova and Oskaloosa satisfactorily concluded, the company expects to build the line from Oskaloosa into Des Moines next season. (Official.)

IOWA CENTRAL & WESTERN.—This company was incorporated in Iowa Oct. 27, with a capital stock of \$3,000,000, to build a line from a point on the main line of the Iowa Central, near Oskaloosa, to run northwest by the most feasible route into Des Moines, and also to build a line from a point near Belmond to Algona, thence northeast to the boundary line of the state, and to build such other connections with the main line of the Iowa Central as the company may see fit. The incorporators and first Board of Directors are: L. M. Martin, Marshalltown, Ia.; Geo. W. Seever, Oskaloosa, Ia.; Chas. E. Laughlin, New York; Seth Zug, New York; P. H. Bousquet, New York. (See Iowa Central above.)

KANSAS CITY, MEMPHIS & BIRMINGHAM.—The Mayor of Birmingham, Ala., was instructed by the City Council to sign the franchise permitting this company to extend its line to the 24th St. compress. There has been 3½ miles of 75-lb. rail laid between Turner and Rogersville, replacing 67-lb. rail.

KELLYTON & ROCKFORD.—Surveys are reported in progress for this recently incorporated line, to run from Rockford, Ala., east 15 miles, via Hissop to Kellyton, on the Central of Georgia. The road will be standard gage and laid with 40-lb. rails. John L. Cowan of Opelika, Ala., is President. (Oct. 21, p. 769.)

LOUISIANA-NORTH AND SOUTH.—This company has been incorporated in Louisiana to build a line from New Orleans northwest 335 miles, through Camden, Ark., Arkadelphia and Hot Springs, to Fort Smith, Ark. Of this distance 190 miles is in Arkansas. A. L. Atkins of Arcadia, Ia., is Vice-President.

MEXICAN CENTRAL.—H. R. Nickerson, General Manager, writes with reference to the extension from Yurecaro, Mex., that this line, known as the Zamora extension, will be built to Tinquindin, about 190 km. (118 miles) through Yurecaro. Engineering parties are now in the field and surveys have been made to Zamora. On that section of the road the maximum grade is 1% and the maximum curve 60°. Grading was completed for 30 km. (18.6 miles) under the old Michoacan & Pacific, and track laying will be begun about the first of the year. (Oct. 21, p. 768.)

As to the line from Orendain northwest 30 km. to Tequila (Sept. 23, p. 696), no arrangements for building have as yet been made.

MEXICAN INTERNATIONAL.—The Monterey branch from Reata, Mexico, southeast 70.8 miles to Monterey, is rapidly nearing completion. Rails are laid for 60 km. (37.3 miles). The three-span bridge at the Delgado canyon is completed. (Sept. 9, p. 656.) It is understood that the company is to begin work soon on the Durango extension.

MEXICO, CUERNAVACA & PACIFIC.—Rails are laid as far as Cocula, 180 miles, from the City of Mexico, and work is in progress on the remaining section of 150 miles to Acapulco. (Apr. 15, p. 285.)

MINNEAPOLIS & CHAMPLIN.—Grading is reported nearly completed for the entire 15 miles of this line from Minneapolis, Minn., north to Champlin. It is expected that track laying will be begun early this month. John Grant of Faribault, Minn., has the contract. C. D. Staples of St. Paul is President and S. M. Hanley General Manager.

MUSCATINE-NORTH AND SOUTH.—Grading is completed for 20 miles on this line from Elrick, Ia., north 30 miles to Muscatine. W. R. Stewart, Jr., 58 Board of Trade Building, Chicago, is President. (Aug. 19, p. 603.)

NEW ROADS.—The road now being built by the East Jordan (Mich.) Lumber Co. is to be a standard gage line running from the company's mills in East Jordan south about 18 miles to its lumber land in Antrim. (Oct. 21, p. 768.) About seven miles is surveyed and about 10 miles will be built this fall. The work is being done by the company. All the rails and rolling stock needed for the first 10 miles are bought. (Official.)

NEW YORK & OTTAWA.—The Ottawa & New York Co. is surveying the route of the independent freight terminal which the company proposes to establish at Ottawa, Ont.

NEW YORK CENTRAL & HUDSON RIVER.—Geo. S. Good & Co. of Lock Haven, Pa., have received a contract for building a branch three miles long to run from Patton, Pa., along the mountain side on the Beech Creek line to the new coal enterprise at St. Boniface. It will cost \$30,000. The contractors expect to begin work this week and will require about 60 days to complete the branch. The company has all the rail and track material.

OSHKOSH & STEVENS POINT.—This company has been incorporated in Wisconsin to build a line from Oshkosh to run northwest about 70 miles to Stevens Point. Albert Schaeffer of St. Paul, Minn., and J. W. Edwards of Winneconne, Wis., are among the incorporators. It is stated that surveys have been made and that bonds are to be issued by the towns along the route, as follows: Poyissippi, \$6,800; Springwater, \$4,600, and Wild Rose, \$4,900.

POINT HARBOR & TERMINAL JUNCTION.—This company was incorporated in New York Oct. 29, with a capital stock of \$1,000,000, to build a steam surface freight road from Smoke's Creek, at the junction of the Terminal Railway of Buffalo with the Lake Shore & Michigan Southern, to run to Buffalo Harbor at Stony Point, four miles. The Directors are Edward T. Hingston, Stephen Lockwood, S. Munch Kellander, Herbert Meldrum, Stephen T. Lockwood, William E. Hingston, Harry L. Lockwood, Charles McAllester and John H. Lockwood of Buffalo.

RESTIGOUCHE & WESTERN.—About 600 men are at work on this line which is proposed to run from near Campbellton, N. B., west about 106 miles to the St. John River. Grading is completed for 11 miles, and a steamer has arrived at Campbellton from Baltimore, Md., with 984 tons of rail. (Oct. 7, p. 732.)

RUTLAND-CANADIAN.—A bill has been introduced into the Vermont Legislature to incorporate this company, with a capital of \$1,000,000, to build the proposed extension of the Rutland road from Burlington north through the chain of islands in the northern part of Lake Champlain to Alburgh, to connect with the Canada Atlantic. It also provides for two branches, one to the Canadian and the other to the New York line. The incorporators are: Wallace C. Clement, H. G. Smith, Frank R. Wells, Frederick W. Wilder, W. W. Stickney, George R. Bottom, John W. Stewart, W. Seward Webb and Percival W. Clement. (March 11, p. 189.)

SABINE PASS & NORTHWESTERN.—The route of this recently incorporated company's line (Oct. 28, p. 786) is from Sabine Pass, Tex., on the Gulf of Mexico, to run northwest about 300 miles to Bonham. Among the incorporators are W. H. Brooker, San Antonio; J. E. Martin and S. S. Mays, Fort Worth; R. M. Lusk, Bonham, and T. P. Davis of Smith County.

ST. JOSEPH & GRAND ISLAND.—The cutoff from Gower, Mo., to Trimble, 11 miles, is reported completed. (Oct. 7, p. 732.)

ST. LOUIS & OKLAHOMA CITY.—Track is laid for the entire distance on this extension of the St. Louis & San Francisco from Sapulpa, Ind. Ter., west 103.32 miles to Oklahoma City. T. G. Jones of Oklahoma City is President. (Sept. 23, p. 697.) The road will be extended, according to report, for 100 miles west of Oklahoma City.

ST. LOUIS SOUTHWESTERN.—In the annual report it is stated that 21.7 miles of track was laid with 75-lb. rail. Wherever this rail was laid the grade was reduced to 1 per cent. The 56-lb. rail replaced by the 75-lb. rail was relaid on the main line in Texas south of Waco, replacing 25-lb. rail. During the year 1932-810 was expended in laying spurs and side tracks.

SONORA.—It is reported that this road is to be extended south from Guaymas, Tex., to the Pacific coast to Mazatlan, where connection will be made with the new extension of the Mexican International. The Sonora runs up to Benson, Ariz., connecting with the Southern Pacific.

SPRING GARDEN CONNECTING.—The committee on incorporations of the Allegheny (Pa.) Council voted Oct. 25 to grant a franchise to this company, which proposes to dig a tunnel about 900 ft. long and to build about three miles of road in that city, connecting the Pennsylvania and the Pittsburgh & Western. Jas. Swindell of Allegheny City is a Director. (Apr. 1, p. 246.)

TEXAS MIDLAND.—There are 100 state convicts at work ballasting the line with gumbo from Terrell, Tex., north to Paris, 84.1 miles.

UTAH & PACIFIC.—Rails had been laid for seven miles last week on this line from Milford, Utah, southwest 76 miles to the Nevada state line, and track laying is progressing at the rate of half a mile a day. A. W. McCune, Salt Lake City, Utah, is President.

WASHINGTON COUNTY.—The section of this road from Calais, Me., to Eastport has been conditionally accepted by the State Railroad Commissioners and trains are to begin running at once. (Oct. 7, p. 732.)

WHEELING & LAKE ERIE.—The receivers have made application in the United States Circuit Court, Columbus, O., for leave to borrow \$25,000 to pay expenses of extending the tracks to certain coal mines.

WYOMING & GRUNDY.—This company has been formed in California, with a capital stock of \$500,000, to build a standard gage road from McDowell to Grundy, Va., with a branch 25 miles running north into Kentucky. The directors are R. L. Bardslee, John M. Bonner, Herman de Laguna, E. E. Forrest and Sam H. Cohn, all of Stockton, Cal.

Electric Railroad Construction.

AMHERST, MASS.—The Selectmen of Amherst have given a franchise to the Northampton & Amherst Electric RR. Co. The projectors of this enterprise have been trying for over a year to get a franchise in Amherst. Franchises have been secured in Hadley and Northampton and work will probably be begun in the spring. A bridge must be built across the Connecticut.

BANGOR, ME.—We are officially informed concerning the proposed extension of the Bangor, Hampton & Winterport Ry., that the work will be done in the spring; it will be 7 or 8 miles long and will extend from Hampton Corner through North Winterport to Winterport, and perhaps to Frankfort. Grading and track laying will be done by the company. A bridge and one or two trestles will be built. Bids will be asked for in about 60 days for 950 tons of 60-lb. rails. H. L. Mitchell, President; C. D. Stanford, Treasurer; James H. Green, Purchasing Agent and Superintendent. (Oct. 28, p. 787.)

BRISTOL, R. I.—R. D. Bullock of Bristol, it is stated, has secured a franchise to build an electric railroad from Bristol to Mt. Hope Park, about four miles, and one for a road from Seacourt to Tiverton, 11 miles.

BUFFALO, N. Y.—The Buffalo & Lockport Ry. Co. will double track its line from Tonawanda to Lockport. Much of the road is laid with 63-lb. rails, which will be replaced with 80-lb. It is stated that a new power station will also be built between Tonawanda and Lockport.

CAMDEN, N. J.—At a meeting of Camden City Council recently Councilman Maloney introduced an ordinance, which was referred to the Street Committee, to grant right of way for a double track electric elevated railroad over streets in Camden. Among those interested in the project are: Walter N. Boyer, Frederick S. Dickinson, Lewis W. Moore and Daniel Caldwell. The plan is to build from Camden to Atlantic City, the tracks to be on elevated structures in Camden and in Atlantic City from the terminal there across the meadows to Absecon. (Atlantic City, May 20, July 8, pp. 367, 503.)

CHICAGO, ILL.—The Illinois Traction Co., which was recently incorporated, will build and operate an electric car line between the Illinois Central station at Grand Crossing and South Chicago. John McCabe, a real estate man, interested in the Calumet district, is acting as agent of the Illinois Traction Co. in securing consents for the right of way. (Oct. 28, p. 787.)

CHILLICOTHE, MO.—Mr. George Hall writes as follows regarding the project to build an electric railroad between Chillicothe and Trenton:

There is an uncompleted railroad grade between Trenton and Chillicothe belonging to the Chillicothe & Des Moines City R.R. Co. There is a plan on foot to lay out a town site on the south line of Grundy County, and sell the lots at \$300 each and give the purchasers \$300 worth of stock in the company to be formed. With this money finish grading, bridge and lay ties, then bond the road for sufficient to finish and put in running operation. So far the outlook for the plan is not very bright, and we fear it will not be made a success. (Oct. 21, p. 768.)

CINCINNATI, O.—The Cincinnati & Hamilton Electric St. Ry. Co. has completed its line from Hamilton to College Hill, outside Cincinnati, about 17 miles. Among those chiefly interested in this road are Peter Schwab, J. C. Hooven and G. A. Rentschler. The Cincinnati, Lawrenceburg & Aurora Electric St. Ry. Co. filed articles of incorporation. The capital stock is \$10,000 and the incorporators are J. C. Hooven, George H. Helvey, G. A. Rentschler, C. E. Hooven and Fred D. Schafer. The headquarters of the company will be at Aurora.

The Mill Creek Valley St. R. R. Co., local papers state, has let a contract to the International Construction Co. of Detroit, Mich., for making improvements that practically amount to rebuilding the line. The work is to cost nearly \$1,000,000. A new power house will be built at Hartwell. This company was formerly known as the Cincinnati, Hamilton, Middletown & Dayton St. Ry., and as such was chartered in 1894. The road opened in June, 1898, and operates what was known as the Main St. line of the Cincinnati Inclined Plane R.R. Co., extending from the Zoological Garden in Cincinnati to Lockland, eight miles north. The road will now be extended two or three miles further north to Glendale, where a branch will be built about 12 miles long to Hamilton. A short branch will also be built from Carthage, on the main line, to Reading.

CORNWALL, ONT.—The Cornwall Electric St. Ry. Co., Ltd., will make extensive improvements. D. A. Starr is President and General Manager.

DAYTON, O.—The Dayton & Xenia Traction Co. is incorporated, with a capital stock of \$300,000, to build and operate an electric railroad between Dayton and Xenia, about 15 miles. The incorporators are J. M. Wilson, O. O. Ozias, F. D. Bittinger, Isaac G. Kennedy and Philip A. Kemper.

DOYLESTOWN, PA.—We are officially informed that the Doylestown Electric Ry. has not yet started building, as the company is not in possession of all rights of way over the proposed route. Frank N. Booz, President. (July 1, July 15; pp. 485, 522.)

EXETER, N. H.—At the annual meeting of the Exeter St. Ry. Co. the issue of \$50,000 of new stock was authorized, as was also a 10-year lease of the road to the Amesbury & Hampton St. R. R. Co. (See Amesbury, Oct. 28, p. 787.)

GREENSBORO, N. C.—Mr. W. M. Barber, Secretary and Treasurer of the Greensboro Industrial & Immigration Association, informs us that the city of Greensboro offers to give the contract for street lighting to the company or individual that will establish a street railroad and electric lighting and power plant. Bids for building such a plant are to be opened Nov. 15, we presume by the association.

HULL, QUE.—The question of extending the Hull-Aylmer electric railway to Gattineau Point is under consideration. Alexander Fraser, President; W. J. Conroy, Secretary and Treasurer.

KENOSHA, WIS.—Press dispatches report that the City Council has granted a franchise to the Milwaukee, Racine & Kenosha Electric Ry. Co. for a right of way through that city, which the company has been trying to get for about two years. When this line is built through Kenosha it is understood the 16 miles to connect that city with Waukegan, Ill.,

will soon be completed, and form a part of the electric road between Chicago and Milwaukee.

LINCOLN, ILL.—It is reported that at a special meeting, Oct. 24, the City Council granted the Lincoln Electric St. Ry. Co. an extension of 40 years to its franchise, provided that unless the company builds a loop of nearly two miles near the Lincoln University within 24 months, the franchise shall be forfeited.

NEW YORK, N. Y.—The Union R. R. Co. has important plans for extensions and improvements in the Borough of the Bronx. A new trolley line was recently opened between Kingsbridge and Yonkers. This line will be connected with the present High-bridge line by tracks laid along Sedgwick avenue, and then through cars can be run from Harlem Bridge to Yonkers. A branch line is being built between Mount Vernon, Pelham and New Rochelle. Arrangements have been completed for laying a double track from West Farms along the West Farms road to Morris Park, and then along Morris Park avenue to Bronxville. It is the intention of the company, as soon as the bridge over West Farms Creek is completed, to connect the Unionport line with the Westchester and Boulevard lines.

PERTH AMBOY, N. J.—The Perth Amboy R.R. Co. is reported incorporated to build a railroad, presumably electric. Capital stock, \$30,000. The incorporators are Leonard Lewisohn, Adolph Lewisohn and Charles J. Witterberg of New York City; James C. McCoy, George J. Haney, Wm. E. Tobey, O. P. Sells, Wesley J. Havell and Sidney Riddlestorfer of Perth Amboy.

RIDGETOWN, ONT.—It is reported that Messrs. Robert Ferguson, M. P. P., and W. E. Gundy, barrister, are interested in a movement to secure an electric railroad between Thamesville, Ridgeway and Rondeau Park.

RIVERSIDE, CAL.—The Riverside & Arlington Ry. Co. is making rapid progress in changing its motive power from horses to electricity.

WATERBURY, CONN.—Press reports state that local men are interested in a project to build an electric railroad between Southington and Waterbury, nine miles.

WESTBORO, MASS.—The Westboro, Hopkinton & Milford R.R. Co. is reported incorporated, with a capital stock of \$80,000, to build a railroad, presumably electric. Among the incorporators are Wm. S. Reed, Leominster; Melvin H. Walker, Westboro, and Frank W. Wood, Hopkinton.

GENERAL RAILROAD NEWS.

Railroad Earnings.

Showing the gross and net receipts for the periods ending at the dates named:

	1898.	1897.	Inc. or Dec.
Pittsburgh & Western.			
1 month.....	Gross \$298,252	\$271,585	I. \$26,667
1 ".....	Net 82,441	58,798	I. 23,643
2 months.....	Gross 563,908	549,252	I. 14,656
2 ".....	Net 155,116	155,750	D. 634

	1898.	1897.	Inc. or Dec.
Sept. 31.			
Allegheny Valley.			
1 month.....	Gross \$237,975	\$238,946	D. \$971
1 ".....	Net 115,113	115,781	D. 668
9 months.....	Gross 1,070,354	1,026,437	I. 43,917
9 ".....	Net 814,368	742,067	I. 72,301

	1898.	1897.	Inc. or Dec.
Buffalo, Rochester & Pittsburgh.			
1 month.....	Gross \$338,231	\$318,069	I. \$20,162
1 ".....	Net 116,866	121,675	D. 4,809
3 months.....	Gross 1,028,245	937,242	I. 91,003
3 ".....	Net 367,421	336,387	I. 31,034

	1898.	1897.	Inc. or Dec.
Canadian Pacific.			
1 month.....	Gross \$2,396,385	\$2,344,529	I. \$51,856
1 ".....	Net 1,092,514	1,058,891	I. 33,623
9 months.....	Gross 18,254,632	16,396,340	I. 1,858,292
9 ".....	Net 6,859,907	6,645,851	I. 214,056

	1898.	1897.	Inc. or Dec.
Central of Georgia.			
1 month.....	Gross \$458,224	\$500,085	D. \$41,861
1 ".....	Net 158,023	196,275	D. 38,252
3 months.....	Gross 1,324,862	1,241,494	I. 83,368
3 ".....	Net 420,060	392,729	I. 27,331

	1898.	1897.	Inc. or Dec.
Central of New Jersey.			
1 month.....	Gross \$1,155,850	\$1,209,044	D. \$53,194
1 ".....	Net 494,843	575,761	D. 80,918
9 months.....	Gross 9,084,379	9,249,739	D. 165,404
9 ".....	Net 3,471,648	3,485,365	D. 13,717

	1898.	1897.	Inc. or Dec.
Chesapeake & Ohio.			
1 month.....	Gross \$1,022,201	\$937,823	I. \$84,378
1 ".....	Net 363,973	325,728	I. 38,245
3 months.....	Gross 3,022,095	2,901,932	I. 120,163
3 ".....	Net 1,068,213	1,006,361	I. 61,852

	1898.	1897.	Inc. or Dec.
Chicago, Burlington & Quincy System.			
1 month.....	Gross \$3,929,553	\$4,414,242	D. \$484,689
1 ".....	Net 815,566	1,162,163	D. 346,597
3 months.....	Gross 11,070,346	11,311,314	D. 240,968
3 ".....	Net 1,729,934	2,186,465	D. 456,531

	1898.	1897.	Inc. or Dec.
Chicago, Milwaukee & St. Paul.			
1 month.....	Gross \$3,692,184	\$3,210,896	I. \$481,288
1 ".....	Net 1,406,224	1,152,894	I. 253,330
3 months.....	Gross 9,247,165	8,704,904	I. 542,260
3 ".....	Net 3,400,660	3,194,857	I. 205,803

	1898.	1897.	Inc. or Dec.
Denver & Rio Grande.			
1 month.....	Gross \$804,934	\$731,313	I. \$73,621
1 ".....	Net 343,356	292,368	I. 50,988
3 months.....	Gross 2,310,296	2,114,426	I. 195,870
3 ".....	Net 981,875	883,790	I. 98,085

	1898.	1897.	Inc. or Dec.
Erie.			
1 month.....	Gross \$2,954,927	\$3,189,669	D. \$234,742
1 ".....	Net 938,059	888,725	I. 49,334

	1898.	1897.	Inc. or Dec.
Lehigh Valley.			
1 month.....	Gross \$1,979,512	\$1,742,675	I. \$236,837
1 ".....	Net 733,401	622,848	I. 110,553
10 months.....	Gross 15,424,904	15,064,881	I. 359,023
10 ".....	Net 4,125,837	3,416,512	I. 709,325

	1898.	1897.	Inc. or Dec.
Lehigh Valley Coal Co.			
1 month.....	Gross \$1,632,050	\$1,716,109	D. \$84,059
1 ".....	Net 109,264	55,613	I. 53,651
10 months.....	Gross 12,489,265	12,590,744	D. 101,479
10 ".....	Net 925,206	932,859	D. 7,653

	1898.	1897.	Inc. or Dec.
*Net loss.			
Louisville & Nashville.			
1 month.....	Gross \$1,940,957	\$1,864,873	I. \$76,084
1 ".....	Net 656,604	655,858	I. 746
3 months.....	Gross 5,655,369	5,438,493	I. 196,876
3 ".....	Net 1,735,901	1,877,841	D. 141,940

	1898.	1897.	Inc. or Dec.
Mexican Central.*			
1 month.....	Gross \$904,506	\$880,407	I. \$24,099
1 ".....	Net 189,268	188,418	I. 850
9 months.....	Gross 9,737,815	9,406,792	I. 331,023
9 ".....	Net 2,922,800	2,803,789	I. 119,011

	1898.	1897.	Inc. or Dec.
*Mexican currency.			
New York, Ontario & Western.			
1 month.....	Gross \$353,630	\$356,367	D. \$2,737
1 ".....	Net 105,064	114,402	D. 9,338
3 months.....	Gross 1,089,379	1,151,180	D. 61,801
3 ".....	Net 337,294	383,746	D. 46,452

	1898.	1897.	Inc. or Dec.
Norfolk & Western.			
1 month.....	Gross \$1,018,975	\$1,023,302	D. \$4,327
1 ".....	Net 359,667	357,558	I. 2,109
3 months.....	Gross 2,829,474	2,927,282	D. 97,808
3 ".....	Net 938,303	971,805	D. 33,502

	1898.	1897.	Inc. or Dec.
Pennsylvania.			
1 month.....	Gross \$5,790,139	\$5,859,639	D. \$69,500
1 ".....	Net 2,222,711	2,149,911	I. 72,800
9 months.....	Gross 48,039,073	46,788,773	I. 1,250,300
9 ".....	Net 14,727,916	14,731,116	D. 3,200

	1898.	1897.	Inc. or Dec.
Pennsylvania Co.			
1 month.....	Gross .....	.....	I. \$188,100
1 ".....	Net .....	.....	I. 14,300
9 months.....	Gross .....	.....	I. 2,453,800
9 ".....	Net .....	.....	D. 358,800

	1898.	1897.	Inc. or Dec.
Philadelphia & Reading.			
1 month.....	Gross \$1,990,600	\$2,024,274	D. \$33,674
1 ".....	Net 874,336	981,951	D. 107,615
3 months.....	Gross 5,588,213	5,829,408	D. 241,195
3 ".....	Net 2,369,562	2,684,782	D. 315,220

	1898.	1897.	Inc. or Dec.
Philadelphia & Reading Coal & Iron Co.			
1 month.....	Gross \$1,932,654	\$2,421,811	D. \$489,157
1 ".....	Net 155,757	86,607	I. 69,150
3 months.....	Gross 4,948,435	6,625,665	D. 1,677,230
3 ".....	Net 356,142	355,447	I. 695

	1898.	1897.	Inc. or Dec.
St. Louis & San Francisco.			
1 month.....	Gross \$627,995	\$625,111	I. \$2,883
1 ".....	Net 285,329	206,633	D. 78,696
3 months.....	Gross 1,729,795	1,768,913	D. 39,118
3 ".....	Net 684,541	801,314	D. 116,773

	1898.	1897.	Inc. or Dec.
Union Pacific.			
1 month.....	Gross \$1,722,618	\$1,766,705	D. \$44,086
1 ".....	Net 820,791	708,237	I. 112,554
3 months.....	Gross 4,793,260	4,793,995	D. 735
3 ".....	Net 2,173,542	1,671,479	I. 502,063

	1898.	1897.	Inc. or Dec.
Wabash.			
1 month.....	Gross \$1,288,639	\$1,202,508	I. \$86,131
1 ".....	Net 369,252	398,356	D. 29,104
3 months.....	Gross 3,651,142	3,391,324	I. 259,818
3 ".....	Net 1,008,451	1,175,646	D. 167,195

BALTIMORE & OHIO.—The Mercantile Trust Deposit Co. of Baltimore filed a suit in the United States Circuit Court at Cincinnati, Nov. 1, for the foreclosure of the consolidated mortgage against the B. & O., for \$29,000,000. It claims that in August last \$470,900 of interest was due and unpaid. Judge Thompson issued an order to the Receivers to appear in answer at the December term of court at Columbus.

CENTRALIA & CHESTER.—Hearing for the sale of this road has been postponed until Nov. 7. (Oct. 14, p. 751.)

CENTRAL OHIO.—The Stockholders' Executive Committee, of which William H. Conklin is chairman, has issued a circular advising the stockholders to refuse to deposit their stock under the plan of reorganization recently announced under the Baltimore & Ohio plan, which allows for each \$100 of the old common and preferred stock \$100 of the new B. & O. preferred stock. It is understood that negotiations are pending to obtain better terms. (Aug. 26, p. 620.)

CENTRAL VERMONT.—Bondholders of the Consolidated RR. Co. of Vermont, at a meeting held at Boston Oct. 26 (Oct. 14, p. 751) ratified the agreement of the committee previously appointed to take steps toward the settlement of the claims of the holders of the first mortgage 5 per cent. bonds.

CINCINNATI & MUSKOGEE VALLEY.—This reorganized company has filed its new mortgage for \$2,000,000. The road was sold at public auction on June 29, and is now in possession of the Pennsylvania Co. (July 8, p. 504.)

CHICAGO, FORT MADISON & DES MOINES.—An offer is being made to close the receivership of this road. The Receiver was appointed July 28 last on the ground of failure to pay interest on the bonds. (Aug. 5, p. 572.)

COLUMBUS, LIMA & MILWAUKEE.—Judge Ricks of the United States Circuit Court at Toledo, O., Nov. 1, took this road out of the hands of the Receiver, Frederick Riltman, and turned it over to the stockholders. This was on application of Oliver M. Stafford, who filed reports showing that the accounts of the road have been adjusted. (See Railroad Construction column.)

COLUMBUS, SANDUSKY & HOCKING.—The reorganization Committee, of which Louis Fitzgerald is chairman, announces that a majority of the outstanding first mortgage or prior lien bonds and of the general mortgage bonds have been deposited under the plan of reorganization of May 12 last, and this agreement is declared operative. The limit for depositing these securities without penalty, under the plan, has been extended to Dec. 1. The Metropolitan Trust Co. of New York, at Columbus, O., Oct. 25, filed a petition in the U. S. Circuit Court for the foreclosure of the general mortgage of 1895 for \$10,000,000 (\$7,456,000 outstanding.) The Trust Co. alleges that there is due \$200,000 in interest. (Oct. 28, p. 787.)

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HOUSTON & TEXAS CENTRAL.—The stockholders will vote Nov. 15 on the proposition to issue bonds to be secured by first mortgage on that portion of the company's property heretofore known as the Waco & Northwestern. The W. & N. passed into the hands of the H. & T. C. at 12 o'clock midnight June 30. It had been in the hands of a receiver since Dec. 11, 1892, and was sold on Sept. 3, 1895, to Wilbur F. Boyle of St. Louis, who did not comply with the terms of the purchase and take possession of the road until last June. (July 8, p. 504.)

INDIANA & LAKE MICHIGAN.—The sale of this road, already noted, is to take place at South Bend, Ind., at 3 p. m., Nov. 10. The upset price is \$100,000, and each bidder must deposit \$20,000. (Oct. 21, p. 770.)

JAMESTOWN & LAKE ERIE.—Sherman Evarts, as Referee in the foreclosure proceedings, sold this line at Jamestown, N. Y., Nov. 1, for \$200,000 to Bertram & Storrs of 44 Wall St., New York City. The line runs from Jamestown to the Western New York & Pennsylvania Junction, 21.17 miles, with a branch from Mayville to Chautauqua, 2.68 miles. Foreclosure proceedings were begun in August. (Aug. 26, p. 620.)

KENT NORTHERN.—This road has changed its name to the Northern Railway of New Brunswick.

LAKE SHORE & MICHIGAN SOUTHERN.—Speyer & Co. of New York give notice to holders of 7 per cent. consolidated mortgage and sinking fund bonds, due July 1, 1900, that they will receive until Dec. 31 bonds of this issue at their full value on Dec. 1, calculated to a maturity on a 3 per cent. basis, and will deliver in exchange new L. S. & M. S. 3½ per cent. gold bonds, due 1897, at 105 and accrued interest. (May 28, p. 382.) This is in accordance with the refunding plan adopted last year.

LOUISVILLE & NASHVILLE.—Forty Evansville, Henderson & Nashville bonds have been drawn for the sinking fund for redemption at 110, at the office, 120 Broadway, New York, on and after Dec. 1.

MANITOBA & NORTHWESTERN.—In the reorganization of this road there is a strong flavor of the Canadian Pacific. E. B. Osler, the new President, and W. D. Matthews, one of the Directors, are Directors in the C. P. R., and R. A. Smith and H. C. Hammond, two of the new Directors of the M. & N., are members of the firm of Osler & Hammond. It appears that Mr. Osler and his friends have been quietly buying up the bonds of the road for several years past. Recently they offered, through Messrs. Coates & Co., of London, Eng., 86 per cent. on each £100 bond certificate, but only on condition that they secured a clear majority of the bonds, so as to control the road. Through this offer there was transferred £490,000, giving a clear majority. It is not expected that any change will be made in the officials or in the policy of the company. Necessary repairs will be made to the bridge over the Assiniboine River at Millwood, and it will be placed on a permanent foundation. H. M. Allen, the retiring Receiver (Oct. 21, p. 770), who has large claims against the road for working expenses, offers them at 40 cents on the dollar. Mr. Osler recently met the local creditors at Winnipeg and told them that if they would wait until an act of Parliament was passed, enabling the purchasers to take over the road and to consolidate its interests, the new Receiver would pay the Winnipeg creditors the par value of the claims without interest, and this offer was unanimously accepted.

MINNESOTA TRANSFER.—At a meeting of the company held at St. Paul, Minn., Oct. 25, it was decided to issue the \$400,000 bonds required to pay for the recently purchased New Brighton stock yards. (July 1, p. 486.)

NORTHEASTERN.—In his annual message, the Governor of Georgia speaks of the authorized sale of the Northeastern as follows:

The last General Assembly conferred upon the Governor authority to sell the Northeastern Railroad whenever he thought advisable. (Dec. 24, 1897.) I have not offered this property for sale, because I did not deem it advisable in the present condition of the country, but I feel sure that soon a sale can be perfected in compliance with the conditions imposed, for as much or more than the amount of the bonded debt for which the state is liable.

OCONEE & WESTERN.—The holders of certificates issued by the Metropolitan Trust Co., New York, at the meeting held at 45 Exchange place, New York City, Oct. 28, voted to ratify the sale of the bonds under the bondholders' agreement, at a price which would net the owners \$450 on each \$1,000 bond.

RICHMOND, NICHOLASVILLE, IRVINE & BEATTYVILLE.—Judge Barr in the Circuit Court at Louisville, Ky., has set aside the sale of the road made Oct. 6 last. The Special Commissioner, George Durelle, is ordered to make another sale at the upset price of \$210,000, which was offered by John Stites, trustee. This decision was in reply to the petition of Shanahan & Co. (Oct. 28, p. 788.)

ST. LOUIS, PEORIA & NORTHERN.—For the proposed extension from Peoria, Ill., north about 90 miles to Clinton, it is proposed to issue a 4 per cent. mortgage, covering the entire line, at the rate of about \$30,000 a mile, including \$5,000 a mile for equipment. Men in St. Louis and New York have subscribed for \$8,000,000 of the company's 4 per cent. bonds, and the Deutsche Bank and other foreign interests have taken an additional \$5,000,000 of the bonds. The Chicago Terminal Transfer Co. is to receive \$1,000,000 of the loan in return for a ten years' rental of terminal facilities in Chicago. The mortgage of 1896 is to be cancelled. (Oct. 28, p. 786.)

UNION PACIFIC, DENVER & GULF.—Practically all the bonds have been deposited under the plan of agreement (Oct. 7, p. 734), and over \$28,000,000 of the stock has paid the first installment of the \$5.00 assessment. The rest of the assessment is payable Nov. 28. Arthur Ritter of Hoboken, N. J., a stockholder, has brought suit to stop the pending reorganization, on the ground that it is inequitable to the stock. The road is to be sold at foreclosure Nov. 19. (Oct. 28, p. 788.)

WASHBURN, BAYFIELD & IRON RIVER.—District Attorney McLeod, of Bayfield County, Wis., has begun action asking for a Receiver for this road. The county subscribed \$200,000 in bonds, which have been exchanged for stock of the road, and it is claimed that this is practically all the cash that has been paid in. The county, therefore, claims

a right for a controlling voice in its management. The line runs from Iron River, Wis., east 26 miles to Washburn, with a branch north 13 miles to Bayfield. It was completed last July. (July 15, p. 522.)

WISCONSIN CENTRAL.—The Hart Committee gives notice that securities not already deposited with the Old Colony Trust Co., Boston, or with the Manhattan Trust Co., New York, will be received up to and including Nov. 19. The Manhattan Trust Co. will act as agent for the Old Colony Trust Co. in issuing its certificates of deposit in New York. (Sept. 23, p. 698.)

Judge Jenkins at Milwaukee, Wis., on Oct. 26, directed that the Receivers turn over the terminal property at St. Paul, Minn., to Chas. F. Rand. He was appointed a receiver for the property at St. Paul by Judge Dunn in August last. (Aug. 26, p. 620.) The transfer is made conditional upon the simultaneous execution and delivery by Receiver Rand of a lease of the property to the W. C. Receivers, on the agreement that they are to pay Mr. Rand \$21,305.49 in consideration of the use of the property from Feb. 1, 1887, to Sept. 20, 1888, and the annual rental from that date of \$13,000. The terminal property mortgage was made by the Minnesota, St. Croix & Wisconsin, now a part of the W. C. system.

Electric Railroad News.

LIMA, N. Y.—The Lima & Honeoye Falls Electric RR. Co. has made a mortgage for \$40,000 with the Buffalo, Loan, Trust & Safe Deposit Co., to cover its road recently completed. (Oct. 7, p. 733.)

NEW BRUNSWICK, N. J.—Press reports state that Edward H. Radel and Gottfried Krueger, the principal stockholders of the Brunswick Traction Co., have secured a controlling interest in the New York & Philadelphia Traction Co.

NEWPORT NEWS, VA.—A syndicate headed by Messrs. Alexander Brown & Sons of Baltimore has bought a controlling interest in the Newport News, Hampton & Old Point Comfort Electric Ry.; \$800,000 worth of bonds and \$400,000 of cumulative stock were turned over to the syndicate. A new company has been organized, the Newport News & Old Point Ry. & Electric Co., and the following officers elected: W. J. Payne, Richmond, Va., President; W. A. Post, Newport News, Vice-President; H. L. Schmelz, Hampton, Treasurer; I. C. Zollcoffer, Richmond, Secretary. Among the Directors are Alexander Brown of Baltimore, and M. E. Ingalls of Cincinnati. The new company has made a mortgage with the Maryland Trust Co. to secure \$900,000 of 5 per cent. gold bonds.

NEW YORK, N. Y.—The following is the report of the earnings and expenses of the Metropolitan St. Ry. Co. for the quarter ending Sept. 30, 1898, and compared with 1897:

	1898.	1897.	Inc or Dec.
Gross earnings	\$2,907,562	\$2,217,942	I. \$689,620
Operating expenses	1,466,641	1,114,351	I. 352,290
Net earnings	\$1,440,921	\$1,003,591	I. \$437,330
Other income	181,737	164,386	I. 17,351
Interest, taxes, etc.	1,070,849	783,791	I. 287,058
Balance surplus	551,809	384,186	I. 167,623

TRAFFIC.

Traffic Notes.

The Japanese Government has lately had shipped from Peoria, Ill., 23 carloads of spirits, to be used in making smokeless powder.

The reporters of Minneapolis continue to print items indicating that they are fully satisfied that the railroads leading out of that city have pooled the flour traffic; and the percentages supposed to be allotted to the eight different roads are published.

Large shipments of grain continue to be made from the West to the Atlantic Seaboard at very low rates. It is stated that millions of bushels of wheat are being carried to Baltimore and Philadelphia at nine cents per 100 lbs., and of corn at eight cents. Wheat is being carried from the Missouri River to Chicago at 10 cents per 100 lbs.

Rates for the carriage of corn from American ports to Europe continue to increase, there being a marked scarcity of vessels, due, it is said, to the engagement of many steamships by the English Government to carry coal in case there shall be war. On Monday of this week the rate on grain per quarter to Cork for orders was 4s. 7½d., as compared with a rate of 3s. 3d. on Sept. 1. The berth rate, New York to Liverpool, is 5d. a bushel, which is just double the rate which prevailed two months ago.

The newspapers have published the views of numerous railroad officers concerning the effects of the Supreme Court decision putting an end to all rate-regulating associations. They are practically unanimous in declaring that a pooling law is now necessary. The Vice-President of a Chicago road expressed himself to a reporter thus: "I do not see how the railroads can continue to publish joint rate sheets—either freight or passenger tariffs—in view of the Supreme Court's decision against the Joint Traffic Association. A joint rate sheet is prima facie evidence of an agreement between railroads to charge the same rates. It saves the railroads lots of money to unite in publishing tariffs. That is about the only benefit we derive from some of our associations. We would be glad if we were not bound by contracts to pay big salaries to some commissioners for several years to come. It is not their fault that they cannot render the services for which we engage them. We all knew in the bottom of our hearts after the Trans-Missouri decision that we could not have any associations to make or maintain rates, but we hoped against hope and 'reorganized' some of the associations and omitted from our articles of agreement the real object of all of them, but we fooled nobody but ourselves. The Supreme Court simply lifted the lid and saw what we were cooking. That settled it."

Joint Traffic Association.

A call has been issued for a meeting of the Board of Control on Friday, Nov. 4, to have a full discussion of the situation growing out of the decision of the United States Supreme Court. James C. Carter, senior counsel to the Association, will attend the meeting and lay before the presidents the legal features of the decision.

Railroad Earnings and Rates in Texas.

The State Railroad Commissioners of Texas have recently ordered the railroads to reduce their rates

on cotton, the change to go into effect Nov. 2. The railroads are preparing, or at least, seem to be preparing, to contest in the courts the rightfulness of the Commissioners' order, and the subject has been discussed by the newspapers with great vigor. Last week, Chairman John H. Reagan, of the Commission, came out in an interview asserting that the railroads have enjoyed such increased incomes during the past two or three years that they can afford to reduce rates on cotton. Net earnings to June 30 last were \$10,588,290, an increase of \$2,536,102 over the preceding year, and that year was much better than the one before it. The rates, as reduced by the Commissioners, are claimed to be still much higher than for similar distances in Georgia or North Carolina. For a distance over 165 miles (to Galveston), the rate is 56 cents per 100 lbs.; in Georgia the rate for 165 miles is 32 cents, and in North Carolina the same. The railroads of Texas earned, net, in the year to June 30, 1896, five per cent. on their fair valuation; for the next year 5.69 per cent., for the next (last) year 7.49 per cent. The fair valuation, as fixed by the Commissioners, is 141 millions, whereas the stock and bonds of the companies amount to 369 millions.

Chicago Traffic Matters.

Chicago, Nov. 2, 1898.

The decision of the Supreme Court in the Joint Traffic Association case already affects rates. Some time ago the eastbound lines agreed to raise the minimum carload weight on dressed beef from 10 to 11 tons, making a difference of about \$9 per car, the change to begin Nov. 1, but when Nov. 1 arrived it was found that but one road, the Michigan Central, had given the 10 days' notice to the commission. The failure of the other roads to keep their agreement on this point brings the Michigan Central out in a shining light as a rate advance in the eyes of the shippers. Local freight officers say that the advance would have been made by all the roads had not the Supreme Court stepped in and taken the life out of all agreements.

As yet no move has been made to dissolve the associations having headquarters in this city. Executive officers of the roads of the Western Trunk Line Committee will meet in St. Paul in a few days to discuss the status of their organization under the Supreme Court decision. It is not believed that any of the local associations or committees are unlawful. Eastbound rates are still in fairly good shape from the present standpoint. That is to say, they are as firm as they have been for six months, which means that they are firmly lodged in the bottom of the ditch.

It is now said that the all-rail grain rate will go up to 20 cents Nov. 10. Failure to give proper notice to the commission caused a postponement of the advance from Nov. 1 to Nov. 10.

Notwithstanding the close watch that is being kept on the actions of scalpers by railroad agents and commercial bodies since the anti-scalping movement was begun, the ticket manipulators have abandoned none of their crooked methods. Special agents in the employ of the Central and Western passenger associations are securing fresh evidence every day against the brokers. This evidence is going to assume voluminous proportions by the time Congress is ready to hear it. Judge Dunne has held that the Illinois anti-scalping law is unconstitutional; but at the same time he refused to release three local scalpers who were arrested under its provisions. The judge held that habeas corpus was not the proper action to secure the liberty of the scalpers under the law, regardless of the constitutionality of the latter. Chairman Donald of the Central Passenger Association claims to have evidence of two violations of the recent injunction issued against the Chicago scalpers enjoining them from handling the iron-clad signature form of jubilee tickets. The evidence has been turned over to the attorney representing the eight eastbound lines for which the injunction was issued.

The conference between the general passenger agents of the Western roads and those of the Canadian Pacific and Grand Trunk in this city resulted satisfactorily to the Western officers. While immigrant rates and the differential question were not entirely settled, much progress was made, and it is the general opinion that at the next meeting (Buffalo, Nov. 9), a complete settlement of all existing troubles between the Canadian Pacific and the Western roads will be effected.

At a joint meeting of the representatives of the Western roads of the Western Passenger Association and those of the Southwestern Passenger Association in this city, it was agreed to issue a joint clergy permit that will be good over the lines of both associations. The permits will be issued by the clergy bureaus of the two associations in Chicago and St. Louis, and the fee for them will be advanced from 50 cents to \$1. It was also agreed at this conference to shape the clergy rules of the Western Passenger Association so that they would conform as nearly as possible with those of the Central Passenger Association.

The Lake rate on grain to Buffalo has fallen to about 2½ cents a bushel.

Eastbound shipments of flour, grain and provisions from Chicago and Chicago junctions to and beyond the Western terminus of the Trunk lines for the four weeks ending Oct. 27 amounted to 248,075 tons, as compared with 147,552 tons for the corresponding period of last year. This statement includes 35,121 tons of flour, 137,530 tons of grain, 75,184 tons of provisions. The following table shows the quantities carried by the respective roads:

Baltimore & Ohio.....	17,209
Cleveland, Cincinnati, Chicago & St. Louis.....	20,091
Chicago & Erie.....	44,307
Chicago & Grand Trunk.....	21,743
Lake Shore & Michigan Southern.....	28,862
Michigan Central.....	27,722
New York, Chicago & St. Louis.....	19,098
Pittsburgh, Cincinnati, Chicago & St. Louis.....	22,082
Pittsburgh, Ft. Wayne & Chicago.....	30,955
Wabash.....	15,028
Total	248,075

Eastbound shipments from Chicago (except live stock), as reported weekly by the Board of Trade, for the four weeks ending Oct. 29, were 288,792 tons, as compared with 235,200 tons for the corresponding period of last year. This statement includes shipments to all points by the Eastern roads.

The first statement given above is that furnished by the Chicago Freight Committee. The second does not include shipments from the junctions outside the city. The Freight Committee's statement is made up each week to Thursday night; the other to Saturday night.